United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In reply refer to:
1-1-07-F-2007

JUL 20 2007

Memorandum

To: Manager, California/Nevada Operations Office, Sacramento, California

From: Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Intra-Service Biological Opinion on Issuance of Section 10(a)(B) Incidental Take Permit for the Contra Costa County, the Contra Costa Flood Control and Water Conservation District, the East Bay Regional Park District, and the Cities of Brentwood, Clayton, Oakley, and Pittsburg for Implementation of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan

This document transmits the biological/conference opinion of the U.S. Fish and Wildlife Service (Service), Sacramento Fish and Wildlife Office (SFWO), regarding the issuance of an incidental take permit (ITP) to Contra Costa County (County), the Contra Costa County Flood Control and Water Conservation District (County Flood Control District), the East Contra Costa County Habitat Conservancy (Implementing Entity), East Bay Regional Park District (EBPRD), and the Cities of Brentwood, Clayton, Oakley, and Pittsburg (collectively, the Applicants) for implementation of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP or Plan) pursuant to Section 10(a)(1)(B) and Section 10(a)(2) of the federal Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), and in accordance with section 7 of the Act and their implementing regulations (50 FR 402). The Plan has also been prepared to comply with the California Natural Community Conservation Planning Act (NCCPA) of 2002. The Service proposes to issue an ITP to the Applicants for a period of 30 years. The term "Permits" refers to the ITP and NCCP permits. Your request for formal consultation was received on April 2, 2007.

LIST OF SPECIES FOR WHICH TAKE AUTHORIZATION IS REQUESTED

The Applicants are requesting coverage under the ITP for a total of twenty-eight species (Covered Species). The ITP would cover incidental take for three endangered animal species [San Joaquin kit fox (*Vulpes macrotus mutica*), longhorn fairy shrimp (*Brachinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*)], and five threatened animal species [giant garter snake (*Thamnophis gigas*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana aurora draytonii*), and vernal pool fairy shrimp (*Branchinecta lynchi*)].

The ITP would also authorize the incidental take of golden eagle (*Aquila chrysaetos*), which is currently protected under the Bald and Golden Eagle Protection Act, and eight currently unlisted animal species—Swainson's hawk (*Buteo swainsoni*), tricolored blackbird (*Agelaius tricolor*), western burrowing owl (*Athene cunicularia hypugea*), Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*), western pond turtle (*Clemmys marmorata marmorata*), silvery legless lizard (*Anniella pulchra pulchra*), foothill yellow-legged frog (*Rana boylii*), and midvalley fairy shrimp (*Branchinecta mesovallensis*)—should they become listed in the future during the term of the permit. The ITP would become effective to authorize take of the currently unlisted covered animal species concurrent with their listing under the Act.

Eleven currently unlisted plant species [Mount Diablo manzanita (*Arctostaphylos auriculata*), brittlescale (*Atriplex depressa*), San Joaquin spearscale (*Atriplex joanquiniana*), big tarplant (*Blepharizonia plumosa*), Mount Diablo fairy lantern (*Calochortus pulchellus*), recurved larkspur (*Delphinium recurvatum*), round-leaved filaree (*Erodium macrophyllum*), Diablo helianthella (*Helianthella castanea*), Brewer's dwarf flax (*Hesperolinon breweri*), showy madia (*Madia radiata*), and adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*)] would also be Covered Species and included on the ITP. Although take of plant species is not prohibited under the Act and, therefore, cannot be authorized under an incidental take permit, the plant species would be included on the permit in recognition of the conservation benefits provided to the species under the East Contra Costa County (ECCA) HCP/NCCP. Assurances provided under the "No Surprises" rule at 50 CFR 17.13, 17.22(b)(5) and 17.32(b)(5) extends to all Covered Species.

The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, or possessing of migratory birds. The MBTA identifies a variety of prohibited actions including the taking of individual birds, young, feathers, eggs, nests, etc. Actions conducted under the HCP/NCCP and its Implementing Agreement (IA) will comply with the provisions of the MBTA with strict avoidance measures for actions affecting MBTA Covered Species (golden eagle, Swainson's hawk, and tricolored blackbird). There are currently no MBTA Covered Species that are listed under the Act and subject to a special purpose permit at this time. Should any of the MBTA Covered Species become listed under the Act during the life of the permit, the incidental take permit would also constitute an MBTA special purpose permit for that species for a three year

term as specified under 50 CFR 13 and 50 CFR 21 for MBTA special purpose permit subject to renewal by the Applicants.

SOURCES

This biological opinion is based on information provided in the following documents: (1) the October 2006, final ECCC HCP/NCCP and supporting technical analyses and reports (ECCA Habitat Conservation Plan Authority (HCPA) (HCPA, 2006); (2) the October 2006 final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and supporting technical analyses and reports (Service 2006); (3) the January 2007 final ECCC IA; (4) the October 2004 draft Aquatic Resources Inventory, Classification, and Function for the HCP/NCCP action area (Jones & Stokes 2006a); and (5) various other published and unpublished agency and academic literature and input from the science panel and information in the Service's files.

CONSULTATION HISTORY

In 1997, representatives of Service and the California Department of Fish and Game (DFG) began meeting with representatives from the County, the Cities of Antioch, Brentwood, Clayton, and Pittsburg and the Contra Costa Water District (CCWD) to discuss the possibility of a regional HCP/NCCP in response to growing concern over the rapid pace of urban development, recent species listings including the California red-legged frog and whipsnake, and the cumulative loss of habitat for a variety of native species. The Service and DFG encouraged the local jurisdictions to pursue a regional plan to protect the County's biological resources and provide a coordinated and streamlined permitting process for the rapidly expanding cities within eastern Contra Costa County. By 1999, the four cities, the County, CCWD, and the EBRPD began working together to develop an HCP.

On January 25, 2000, the County Board of Supervisors declared its intent to work with other agencies to prepare an HCP/NCCP for ECCC. An estimate of future growth in the area was commissioned to determine the need for permit under the HCP/NCCP. Stakeholder groups drafted a series of principles that they recommended public agencies adopt before initiating the conservation planning effort. The land use planning agencies adopted these principles as the Principles of Participation in their decision to form the East Contra Costa County Habitat Conservation Plan Association (HCPA), the joint powers authority to develop the HCP. A March 28, 2000, interagency staff report cited many benefits of pursuing an HCP/NCCP.

In April 2000, CCWD committed to work with land use agencies in eastern Contra Costa County to develop, and agreed to provide partial funding for, a regional HCP as a condition of future water deliveries to the agency. This commitment was made during a U.S. Department of the Interior, Bureau of Reclamation (Reclamation) consultation with the Service regarding CCWD's construction of a multipurpose pipeline and future water supply implementation program. The

Service issued a biological opinion (Service file no. 1-1-99-F-93) that addressed the construction, maintenance, and operation of the pipeline as well as the secondary effects of urban growth and development resulting from increased water availability. The Service, Reclamation, and CCWD agreed that a regional HCP would offset the adverse growth-inducing effects of future water deliveries within CCWD's service area. According to the terms of the biological opinion, CCWD cannot deliver more than 148,000 acre-feet of water per year until an HCP is completed and a Section 10(a)(1)(B) permit issued.

Later in 2000, six entities formed the HCPA, a joint powers authority consisting of the Cities of Brentwood, Clayton, and Pittsburg, CCWD, EBRPD, and the newly incorporated City of Oakley. The County initially declined to participate, but in 2001 the County joined the HCPA. The City of Antioch also declined to participate at the time the HCPA was formed. The HCPA subsequently encouraged Antioch to join the HCPA but Antioch did not change its position. The County Flood Control District joined the HCP/NCCP planning effort in early 2004. The Service has been an active participant in preparing the HCP since 2001 when the lead consultant was hired to prepare the Plan. The Service has participated in at least monthly meetings of the agency coordination group and the HCPA Coordination Group (a stakeholder group appointed by the HCPA).

DESCRIPTION OF THE PROPOSED ACTION

INTRODUCTION

The proposed HCP/NCCP is a comprehensive, multi-jurisdictional plan that provides for regional species conservation and habitat planning while allowing the local land-use authorities to manage anticipated growth and development. The proposed HCP/NCCP provides a coordinated process for permitting and mitigating the take of Covered Species as an alternative to the current project-by-project permitting approach.

The proposed HCP/NCCP was prepared by the HCPA, a joint powers authority that is comprised of the Cities of Brentwood, Clayton, Oakley, and Pittsburg (collectively the Cities); Contra Costa County; the CCWD; and the EBRPD. Although not a member of the HCPA, County Flood Control District project and activities will be covered by the Plan. The County and the Cities are the local land use agencies that would be named as Permittees under the Plan and responsible for implementing the proposed HCP/NCCP. The County Flood Control District would also be a Permittee to cover their operations and maintenance of flood control facilities.

The Plan was prepared as an HCP, pursuant to Section 10(a)(1)(B) of the Act, and as an NCCP, pursuant to the NCCPA of 2002. The HCP/NCCP relies on the development in East Contra Costa County being limited to 9,796 acres (defined as the "initial urban development area") or up to13,029, acres (defined as the "maximum urban development area"). Its conservation strategy involves the acquisition of between 23,800 and 30,300 acres of land to create a preserve system that will be protected and managed in perpetuity. Funding for the HCP/NCCP will be generated

through payment of a mitigation fee by developers prior to issuance of development permits from the Cities and County. Additional funding sources include such as fees on rural infrastructure, fees from wetland impacts, new federal and state funding, and contributions of land from local conservation organizations already active in the area of land acquisition.

In addition to land acquisition, the conservation strategy includes measures to restore, enhance, and otherwise manage habitat for the Covered Species. These measures are designed to carry out the 33 biological goals and 91 biological objectives developed for the HCP/NCCP. The biological goals and objectives as well as the overall conservation strategy function at three scales: landscape, natural community, and species. A monitoring and adaptive management framework is proposed to assess the success of overall conservation efforts as well as specific conservation measures within six natural community types at the three scales. Avoidance and minimization measures and other development guidelines are also described in the HCP/NCCP. These measures are required of project proponents seeking coverage through the Permittees under the HCP/NCCP.

ACTION AREA DESCRIPTION

The proposed HCP/NCCP action area is within eastern Contra Costa County, California (see Figure 1-1). The action area covers 174,018 acres, or approximately one-third of Contra Costa County, and is entirely within the eastern portion of the County. The action area is approximately bounded on the south by the Alameda–Contra Costa County line; on the east by the westernmost Delta sloughs between Oakley and the Alameda–Contra Costa County line; on the north by the San Joaquin River shoreline; and on the southwest and west by the western edges of the watersheds of Kellogg and Marsh Creeks, the Mount Diablo Meridian, and the Clayton sphere of influence.

The action area encompasses all or most of five incorporated cities: Brentwood, Clayton, Oakley, Pittsburg, and Antioch (however, Antioch is not a Permittee see description below). Three-quarters of the land in the action area, approximately 128,908 acres, are in unincorporated areas of Contra Costa County.

The *permit area* is the area within the action area where the Permittees are requesting authorization for activities and projects that may result in take of species covered by this Plan (i.e., covered activities). The permit area is land within the action area defined by the following parameters:

The Urban Limit Line (ULL) of Contra Costa County or the city limits of the participating Cities of Pittsburg, Clayton, Oakley, and Brentwood, whichever is largest.

The footprint of specific rural infrastructure projects or activities outside the ULL described in the Plan.

- The boundary of any land acquired in fee title or conservation easement and managed under this Plan (i.e., the HCP/NCCP Preserve System [Preserve System or Preserves]).

Antioch is not a participant in the HCP/NCCP and excluded from the permit area. A limited number of rural infrastructure projects outside the ULL will be included in the permit area, as will management and restoration activities in the Preserve System. Some flood-control projects that are covered under this Plan may occur in Antioch.

The HCP/NCCP has been designed to accommodate reasonable and expected growth of the participating jurisdictions based on current General Plans. However, participating jurisdictions have differing positions on where and how much future growth will occur. To respond to potential changes in land use policy among the participating jurisdictions, the permit area could expand or contract as a result of local land use decisions made independently of the HCP/NCCP, provided that the revised permit area boundary is consistent with successful implementation of the HCP/NCCP conservation strategy by not preventing implementation of the biological goals and objectives. The ITP would not provide coverage to projects within the revised permit area in areas designated as high priorities for acquisition under the HCP/NCCP conservation strategy.

To address this issue, two *urban development areas* are defined for the purposes of the analysis. The *initial urban development area* (IUDA) is most of the area within the current County ULL. Urban development within the IUDA is expected to result in 8,670 acres of impact to land-cover types that may support Covered Species. The *maximum urban development area* (MUDA) is the largest area to which urban development could expand under the terms of this HCP/NCCP. Urban development within the MUDA is expected to result in 11,853 acres of impact to land cover types that may support Covered Species. With either urban development area, another 1,126 acres of impact is expected from rural infrastructure projects and activities within HCP/NCCP preserves. Thus, total impacts allowed under the Plan are 9,796 acres and 13,029 acres with the IUDA and MUDA, respectively.

The urban development area covered under the HCP/NCCP at the end of the permit term could fall anywhere in the range defined by the IUDA and the MUDA, depending on local land use decisions that occur during the permit term. For the purposes of this biological opinion, impacts resulting from the maximum urban development area are the basis for our analysis of impacts.

COVERED ACTIVITIES

Covered activities in the HCP/NCCP fall into three categories.

1. All activities and projects associated with urban growth within the urban development area.
2. Specific projects and activities outside the ULL.
3. Activities that occur inside the HCP/NCCP preserves.

Activities within the Urban Development Area

This category includes all ground-disturbing projects and activities that may occur within the urban development area. This category is as inclusive as possible to accommodate urban growth; it includes the construction and maintenance of typical urban facilities, both public and private, consistent with local general plans and local, state, and federal laws. This category includes, but is not limited to, the construction, maintenance, and use of the following facilities:

Residential, commercial, and industrial facilities (e.g., homes, retail centers, office buildings, factories, warehouses).

Public service facilities such as police stations, fire stations, hospitals, churches, public health centers, schools, administration centers, private airports, and community centers. Funeral and interment services such as mortuaries, crematoriums, mausoleums, and cemeteries are also included in this category.

Recreational facilities such as neighborhood parks, golf courses, indoor and outdoor sports centers, racetracks, campgrounds, and trails.

Transportation facilities including sidewalks, bike paths, paved and unpaved roads, culverts, fords, bridges, and highways.

Public and private utilities including transmission lines, telecommunications lines, and gas lines.

Water supply and delivery facilities including water treatment plants, water supply pipelines, and canals.

Flood-control facilities including dams, armored creeks, detention ponds, and streams.

Waste management facilities including sewage treatment plants, recycling centers, and transfer stations.

Rural Infrastructure Projects

Specific rural infrastructure projects outside the ULL are also covered activities under the HCP/NCCP (all infrastructure projects within the ULL are covered as urban development). A complete description of these covered activities is found in chapter 2 of the HCP/NCCP.

Buchanan Bypass- a four-lane major arterial that will connect Kirker Pass Road with Somersville Road and Donlon Boulevard

- Brentwood-Tracy Expressway/State Route 239- the Byron Highway would serve as an alignment of SR 239 and would extend from the Vasco Road-Byron Highway Connector to the County line. It will convert the Byron Highway to an expressway or multi-lane freeway. SR 239 may replace the Byron Highway widening project

Bridge Replacement, Repair, or Retrofit- repairs; seismic or other safety retrofit, or complete replacement; increasing the number of lanes is not a covered activity unless associated with a road construction project specifically covered in the HCP/NCCP

- Byron Airport Expansion- additional aviation, including runway expansion and commercial development
- Byron Highway Northern Extension-extend the Byron Highway north from Delta road to East Cypress Road

  Bryon Highway Widening- shoulder-widening to improve safety of the Byron Highway at Comino Diablo and from Hot Springs Road to the county line, left turn lane at the school district office and Byron Elementary School and intersection improvements.
- eBART- rail service would run in the median of SR 4 from Bay Point to Loveridge Road and then on the existing railroad tracks through Bryon and on to Tracy (San Joaquin County). Any road or railroad infrastructure and parking lots needed specifically to support eBART would be covered. The Antioch and Byron stations will be covered by this HCP/NCCP.
- Kirker Pass Road Widening- will add an approximately 9,600-foot truck-climbing lane on Kirker Pass Road between Clearbrook Drive in Concord and the Pittsburg city limit.
- Marsh Creek Road Realignment at Selected Curves- realigns select curves of Marsh Creek Road and widens shoulders between Aspara Drive and Deer Valley Road.

  New Bicycle Trails- many are within the ULL and would be covered by the NCCP/HCP automatically however, many are located outside the ULL and will be covered by the NCCP/HCP.

  Various Road Safety Improvements- upgrade the safety of existing rural roads including, but not limited to, regrading road shoulder, increasing lane width, road realignments, and installation of traffic signals.
- Road Widening or Extension Projects
  - Bethel Island Road Widening- widened from a two-lane road to a four-lane arterial from East Cypress to Gateway Road on Bethel Island and a new bridge over Dutch Slough.
  - Cypress Road Widening- widened to a four-lane arterial from SR4 to Bethel Island road.
  - Sand Creek Road Extension- extend eastward for approximately one-third of a mile as a four-lane arterial road to Sellers Avenue
  - Sycamore Avenue Extension- extend as a two lane road from the Brentwood City Limit to Sellers Avenue
  - Walnut Boulevard Widening- would widen from two to four lanes for approximately 2.2. miles from the Brentwood City Limit south to the SR 4 Bypass and Vasco Road
  - Marsh Creek Road Widening- widened from two to four lanes over approximately 4 miles from SR 4 Bypass to the existing SR 4 near Discovery Bay
  - Balfour Road Widening-widened from two to four lanes over approximately 1.3 miles from the Brentwood City Limit west to Deer Valley Road.

- State Route 4 Widening to Discovery Bay- Expand portions of SR 4 from two to four lanes

- Vasco Road to Byron Highway Connector- would extend an existing road or build a new road to provide a connection between Vasco Road (SR 84) and the planned SR 239 (Byron Highway). The location has not yet been determined but the HCP/NCCP would cover the footprint of the road within a study area bounded by Vasco Road, Byron Highway, and Armstrong Road to the south, and Camino Diablo to the north.
- Vasco Road Widening/State Route 84- would widen and realigned portions as a safety and capacity enhancement from SR 4 Bypass to I-580 in Alameda County.

  Construction and Expansion of Detention Basins- will expand two existing facilities, one in Lower Sand Creek within the Brentwood City Limit and Lindsey located in the City of Antioch. Construct up to four new detention and sedimentation basins, all are offstream and total approximately 400 acres

  Marsh Creek Reservoir Expansion- provide flood protection to accommodate 100-year flood by a lowering in elevation a 211 acres site on both sides of Marsh Creek Road (152 acres on the west side and 59 acres on the east side) by 5-10 feet. The basins will be designed to flood once every 5-10 years and drain within 72 hours. Portions of the new basins may need to be dredge periodically. Habitat restoration, including riparian, grassland and cottonwood would need to be included in any expansion.

  Channel Improvement and Widening- installation of storm drain line and improve unnamed creek near Port Chicago Highway and Skipper Road in Bay Point; improve West Antioch Creek near 10th Street in Antioch.

All routine road operations and maintenance (O&M) activities that occur within the ULL of participating cities are covered by this Plan. The Contra Costa County Department of Public Works also maintains and operates roads within the action area outside the ULL. The routine O&M of these County-maintained roads outside the ULL is also a Covered Activity. The routine, periodic, and emergency operation and maintenance activities at facilities operated by the County Flood Control District outside the ULL and within Antioch are Covered Activities. The routine and emergency O&M of utility lines in the action area outside the ULL is a covered activity under this Plan, except for the use of pesticides, which is not covered by the ITP.

HCP/NCCP Preserve Activities

Activities required to maintain and operate the new HCP/NCCP Preserve System are also covered by the ITPs. These activities include limited construction and maintenance of passive recreational facilities (e.g., signage), low-impact recreational use (hiking, mountain biking, equestrians), habitat and species management activities, habitat restoration or creation, and habitat and species monitoring.

Neighboring Landowner Provisions

The HCP/NCCP includes a provision for landowners on lands within 1 mile of the Preserve System to obtain take authorization for impacts to Covered Species that occur as a result of routine agricultural activities. Take authorization is provided only for impacts above those already occurring when the Preserve System was established (i.e., those greater than baseline conditions). Neighboring Landowner Assurances provide incidental take permit coverage on an "opt-in" basis for all agricultural lands within 1.0 mile any land that becomes part of the HCP/NCCP Preserve System. This opt-in approach allows landowners to participate willingly in the Plan. Those landowners that do not seek to participate would not be required to do so but would also not receive coverage for incidental take for their ongoing activities.

ACTIVITIES NOT COVERED

The following activities or projects are not covered by the HCP/NCCP:

The Los Vaqueros Reservoir Expansion

- Routine and Ongoing Agricultural Activities (routine and ongoing agricultural activities on lands neighboring HCP/NCCP preserves are covered by this HCP/NCCP)

New Irrigated Agriculture

Wind Turbine Expansion or Operation

- Activities within Seal Beach NWS, Detachment Concord

Construction of Rural Infrastructure Projects not Listed in the HCP/NCCP

- New Rural Landfills

Mining

CONSERVATION PROGRAM OF THE PROPOSED HCP/NCCP

Collectively, the conservation strategy will mitigate the impacts to Covered Species and contribute to the recovery of these species in the action area. The conservation strategy is designed to achieve 33 biological goals and 91 biological objectives. Developed at the landscape, natural community and species scale, the conservation strategy addresses the preservation and management of a preserve system for the benefit of Covered Species. The purpose of the Preserve System is to mitigate for the impacts to Covered Species through the restoration, enhancement, and management to support the natural communities and Covered Species.

The HCP/NCCP also proposes avoidance and minimization requirements and development guidelines. The monitoring and adaptive management strategy requires tracking of the biological

effectiveness of the conservation strategy (conservation measures, species response, Covered Species status, and the overall biological goals and objectives).

Overview of the Preserve System

The conservation strategy is based on the creation of a system of new preserves (the Preserve System) linked to existing protected lands (see Figures 5-2 and 5-3 in the HCP/NCCP for the acquisition priorities that will shape the Preserve System). The design of the conservation strategy creates a preserve System that will:

Preserve approximately 23,800 acres of land under the IUDA or approximately 30,300 acres of land under the MUDA for the benefit of Covered Species, natural communities, biological diversity, and ecosystem function.

Preserve major habitat connections linking existing protected lands.

Enable management of habitats to enhance populations of Covered Species and maintain ecosystem processes.

Preserve design was based on the following principles of conservation biology (Soule and Wilcox 1980; Soule 1986; Primack 1993; Meffe and Carool 1997; Noss et al. 1997):

- Maximize Size. The Preserve System should be as large as possible within funding and management limits. Large preserves allow for large-scale management treatments such as prescribed burning and grazing and the maintenance of natural disturbance regimes such as flooding.

  Preserve the Highest-Quality Communities. The Preserve System should preserve the highest quality natural communities and habitat for covered species in the action area.

- Link Preserves. The Preserve System should link existing and proposed preserves inside and outside the action area to maximize the ability of species to move between preserves; facilitate exchange of genetic material, species migration, dispersal, and colonization; and increase the integrity of the network of preserves (e.g., reducing the extent of preserve edge that is in contact with adjacent land uses.

- Buffer Urban Impacts. The Preserve System should include buffer land within its boundaries. This comprises undeveloped land at the urban edge that ensures a fixed and adequate separation between urban development and natural communities. The purpose of this buffer land is to minimize indirect effects from urban development and to provide a zone for fuel load management while minimizing adverse effects on covered species and communities

- Minimize Edge. The Preserve System should share a minimum amount of edge (i.e., should have the greatest possible area-to-perimeter ratio) with non-preserve land, especially urban development, to minimize the indirect effects of adjacent land uses on the preserve resources and to minimize management costs.

Fully Represents Environmental Gradients. The Preserve System should include a range of contiguous environmental gradients (e.g., topography, elevation, soil types, geologic substrates, slopes, and aspects) to allow for shifting species distributions in response to catastrophic events (e.g., fire, prolonged drought) or anthropogenic change such as global warming.

Watersheds. The Preserve System should include, when possible, entire watersheds, subwatersheds, and headwater streams that are not already in protected status; this approach can help to maintain ecosystem function and aquatic habitat diversity.

Full Ecological Diversity within Communities. The Preserve System should include the full ecological diversity within natural communities in the action area (e.g., species composition, dominant species, physical and climatic factors) in order to maintain sufficient habitat diversity and species and population interactions.

Management Needs. Preserves should be manageable. That is, desired management treatments such as livestock grazing, prescribed burning, or exotic species control must be feasible on the preserve land.

Land acquisition was designed to prioritize areas with the greatest conservation benefit. Six zones were created and specific targets within the zones and subzones are associated with each. Most natural land-cover types will be acquired in Zones 1–5. Tables 1a & 1b of this biological opinion shows land acquisition requirements for terrestrial land-cover types under the IUDA and MUDA. The zones (Figure 1) incorporate all undeveloped land outside the major urban areas of Bay Point, Pittsburg, Antioch, Oakley, and Brentwood that is not already protected in large preserves. Most of this undeveloped land occurs outside the ULL. Large undeveloped areas within the ULL were included in the zones if they had potential conservation value and were connected to undeveloped lands outside the ULL. Rural public facilities were included within zones because their protection status for conservation may be uncertain. The six zones include some areas of small and isolated public lands (e.g., Byron Airport conservation easements) and small and isolated patches of development; these areas would not be acquired as part of the HCP/NCCP Preserve System and are excluded from all calculations of zone size. With these exceptions, the zones represent all undeveloped and unprotected land in the action area with regional conservation value and within which the Preserve System can be designed.

Zone boundaries were determined on the basis of physical and biological features at the landscape level, such as watersheds, ridgelines, and major breaks in land cover types or vegetation communities. The boundaries of each zone are described in Section 5.2.2 of the HCP/NCCP and in Figure 1 of this biological opinion. Table 2 lists the land-cover types and vegetation communities found within each zone. A brief description of each zone (see Section 5.5.2.2 of the Plan for details) is below.

Zone 1: *Pittsburg Hills* (8,613 acres) was created to encompass all the undeveloped and unprotected lands with potential conservation value in the northwest corner of the action area

Zone 2: *Watersheds of Northern Tributaries of Marsh Creek* (14,583 acres) was created to encompass the area dominated by annual grassland with oak savanna and oak woodland land-cover types in the lower elevations of the center of the action area.

Zone 3: *Clayton Area, Mount Diablo Foothills* (2,174 acres) comprises the undeveloped land in the watershed of the main stem of Mount Diablo Creek at the eastern and southwestern edges of the city of Clayton.

Zone 4: *Slopes of Mount Diablo and Main Stem Marsh Creek Watershed* (14,338 acres) was designed to incorporate the area at the highest elevations of Mount Diablo foothills not in public ownership. This area is dominated largely by mixed evergreen forest, dense oak woodland, chaparral, and coastal sage scrub.

Zone 5: *Byron Hills* (13,156 acres) comprises all the unprotected lands dominated by annual grassland and alkali grassland between the Los Vaqueros Watershed lands and the Alameda/Contra Costa County line.

Zone 6: *East County Cultivated Agriculture* (32,916 acres) includes all cultivated agriculture outside the ULL plus conservation opportunities within the ULL in eastern and northern Oakley.

Acquisition in Zone 6 will focus on land suitable for restoration (e.g., riparian woodland/scrub, wetland, and adjacent upland) as habitat for tricolored blackbird, western burrowing owl, Swainson's hawk, and giant garter snake. Credit will also be given to acquisition of some aquatic land-cover types, such as seasonal wetlands, perennial wetland, and sloughs/channels, in Zone 6.

The NCCP/HCP was developed using species distribution data and the species habitat models were developed at a regional scale and general level of resolution, therefore, project proponents must verify in the field all land-cover types and modeled habitat for covered wildlife species as described in Chapter 6 of the HCP/NCCP. All conservation strategy requirements for land-cover preservation, species habitat preservation, and covered plant species preservation will be verified in the field through *planning surveys*. The IE will conduct planning surveys for land-cover type and Covered Species habitat on all lands considered for acquisition to determine whether the proposed acquisition site meets HCP/NCCP requirements. Details of these land-acquisition planning surveys are described in Section 6.2.1 and Section 8.6 of the HCP/NCCP.

The Preserve System will be funded, in part, by fees on covered activities and will fully mitigate the effects of covered activities. However, the Plan specifies that progress towards assembling the Preserve System must stay ahead of progress towards total impacts allowed under the Permits. This sequence ensures that preserve assembly is keeping pace with development and that the IE is making steady progress towards acquiring the full Preserve System. To meet this *Stay-Ahead* provision at the beginning of HCP/NCCP implementation, some land should be acquired prior to any permits being issued under the HCP/NCCP to *jump-start* the Preserve System. However, given the difficulty of acquiring land prior to collecting fees under the Plan, the Jump-Start provision is a guideline (see p. 8-19 of the Plan).

Preserve management is designed to maintain and enhance vegetation communities, habitat for Covered Species, biological diversity, and ecosystem function. The location of preserves and condition of resources within preserves will not be known until suitable sites are identified, surveyed, and purchased. Therefore, site-specific management objectives and techniques cannot be developed until preserve sites are known.

The IE will prepare two types of preserve management plans: system-wide plans and preserve-specific plans. System-wide management plans include an overall approach to control exotic species and recreational uses of preserve lands. Preserve management plans will identify, on the basis of site-specific conditions and preserve objectives, the management/maintenance actions necessary to ensure that desired ecosystem characteristics and functions are maintained and protected. Preserve management plans must minimize the conflicts that may arise when managing for multiple species and habitats. Preserve management plans will implement the system-wide plans for exotic species control and recreational uses. All system-wide and preserve-specific management plans must be approved by the Service and DFG. Plans will also be updated and revised as part of the adaptive management program (see Section 7.4 Chapter 7 of the HCP/NCCP).

Funding

The NCCPA is broader in its objectives than either the Act or California Endangered Species Act (CESA). The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land use. An NCCP must provide for the conservation of species and protect natural communities within the inventory area in perpetuity, which is a standard that goes beyond the requirement of the Act to mitigate for the impacts of projects on covered species. However, it is necessary to separate mitigation obligations of the Plan from the conservation components for two reasons. First, the Service and DFG can only provide grant monies that contribute to the conservation component of the HCP/NCCP, because neither agency can subsidize mitigation. Second, as mentioned above, under the Act the Permittees are only required to mitigate for the impacts of their projects on covered species to receive an incidental take permit. In order to resolve this dichotomy the land acquisition requirements for terrestrial land-cover types were assigned a mitigation component (i.e., acquisition required by the Plan resulting from covered activities) or a conservation component (i.e. acquisition required by the Plan to contribute to a species' recovery) based on a "fair share" analysis found in Chapter 9 of the Plan. It was determined that new development is responsible for 52% of the land acquisition requirements shown in Tables 5-7 or 5-8, and existing development (i.e. the public) is responsible for 48% of land acquisition shown in this Tables 5-7 and 5-8. This fair-share analysis is not applied to wetland land-cover types and those impacts are separated by mitigation and conservation components on the basis of other factors (Tables 5-5, 5-16, and 5-17 of the Plan). However, as the Plan is anticipated to be implemented as a whole, the analysis conducted in this biological opinion assumes the Plan will be implemented as such.

Habitat Restoration and Creation

The majority of the restoration described in the HCP/NCCP will satisfy mitigation requirements (84–85% for the IUDA and MUDA scenarios, respectively). See Tables 5-16 and 5-17 in the HCP/NCCP for details on specific requirements by land-cover type.

The primary means of mitigating impacts and conserving Covered Species and natural communities are preservation of high-quality habitat in accordance with preserve design criteria outlined in Chapter 5 of the HCP/NCCP. However, habitat enhancement, restoration, and creation are important components of the conservation strategy. Some vegetation communities or land-cover types that are lost to covered activities will be replaced1 with the same or similar communities or land-cover types within the preserves. Habitat enhancement, restoration, and creation ensure that there will be no net loss of certain resources (e.g., wetlands, breeding habitat for specific Covered Species). In other cases, restoration and enhancement are used to supplement preservation to mitigate adequately the loss of vegetation communities or land-cover types.

Habitat enhancement improves existing degraded vegetation community. Enhancement involves improving one or more ecological factors, such as native species richness, species diversity, overall vegetative cover, and wildlife habitat function. Habitat enhancement activities typically occur on soils that are largely intact (e.g., soils that have not been tilled or otherwise disturbed). Habitat enhancement will be undertaken within the preserves on all appropriate acreage to conserve the populations of all Covered Species and maintain or improve ecological processes.

Habitat restoration establishes a vegetation community in an area that historically supported it, but no longer does because of the loss of one or more required ecological factors. Restoration may involve altering the substrate to improve a site's ability to support the historic vegetation community. Restoration is required for habitat loss of wetlands, riparian woodland, and oak savanna at ratios varying from 1:1 to 3:1. Additional restoration of some land-cover types will occur regardless of the amount of impact. Although the exact acreage is not known, restoration is estimated at 436–598 acres under the IUDA or MUDA, respectively.

Habitat creation is the establishment of a vegetation community in an area that did not previously support it. Tables 5-16 and 5-17 in the HCP/NCCP show the restoration and creation requirements for land-cover types addressed by the Plan.

Habitat Management

The conservation strategy contains detailed guidelines and recommendations for management, enhancement, and restoration techniques of the following land cover types:

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1 Some vegetation types may not be completely replaced because of uncertainties in the success of restoration techniques (e.g., they may not replace all functions of the original community). In these cases, mitigation ratios are increased to account for these uncertainties.

- Grassland, including native grassland

  Oak woodland and oak savanna
- Wetlands and ponds
- Streams and riparian woodland

  Chaparral/scrub

Conservation Measure 2.1 describes enhancement required for all land-cover types on all appropriate acreage to improve the function of natural communities, maintain or increase populations of Covered Species, and promote native biological diversity within the preserves. The measures address restoration or creation required for impacts on some land-cover types to ensure no net loss of these land-cover types, replace the functions of natural communities and species habitat lost to covered activities, and contribute to the recovery of Covered Species.

Conservation Measure 2.3 describes compensation for impacts on wetlands or ponds through restoration of wetland land-cover types at ratios of either 1:1 or 2:1, as well as through creation of ponds at a ratio of 1:1 (see Tables 5-16 and 5-17 in the HCP/NCCP). The HCP/NCCP will restore or create wetland and pond land-cover types to contribute to the recovery of California red-legged frog, California tiger salamander, western pond turtle, tricolored blackbird, and covered vernal pool invertebrates.

Conservation Measures 2.9 and 2.10 address the management and restoration of streams and riparian woodland/scrub. All degraded streams and riparian woodland/scrub within the preserves will be improved to increase overall ecological functions and values (i.e., species richness and diversity, vegetative cover, wildlife habitat function) and enhance the ability of these habitats to support existing and new populations of Covered Species.

Conservation Measures 2.6, 2.8, and 2.11 provide guidance for managing and/or enhancing oak woodland/oak savanna, chaparral/scrub, and cultivated agriculture, respectively.

SPECIES-SPECIFIC CONSERVATION MEASURES

Covered Wildlife Species

Townsend's Big-Eared Bat

Preservation

The conservation strategy will preserve an estimated 13,000 or 16,500 acres of annual grassland that is expected to benefit Townsend's big-eared bat under the IUDA or the MUDA, respectively. In addition, the conservation strategy will opportunistically preserve suitable microhabitats for roosting bats, such as caves, mines, or other structures. Lands containing maternity roosts or hibernacula are prioritized for acquisition as well as lands containing large trees that provide cave-like conditions may provide night-roosting habitat (Fellers and Pierson 2002).

Minimization
Covered activities are not anticipated to affect directly the habitat features important to bats. Planning and preconstruction surveys are required in areas with suitable roosting habitat. If occupied sites are identified, seasonal restrictions on construction are required (Chapter 6, Section 6.3.3).

Recreational access to caves within the Preserve System will be prohibited.

Management Actions
Preserve management will also benefit Townsend's western big-eared bat. For example, several measures will increase watering habitat by restoring streams, wetlands, and associated riparian habitat in habitat preserves and increase prey base by controlling the use of insecticides in preserves (see Conservation Measures 1.8, 2.12, 2.2, 2.3, and 2.9 in Chapter 5 of the HCP/NCCP). Any roost locations within the Preserve System will be documented and mapped, and results will be shared with Service and DFG but otherwise kept confidential. Abandoned mines within the Preserve System will be stabilized, if feasible, and gated, when practicable, to enhance roosting habitat for these bats. In addition, the creation of artificial hibernacula will be investigated and implemented, if appropriate, in an adaptive management context.

San Joaquin Kit Fox

Preservation
The conservation strategy will protect an estimated 17,164 acres to 20,465 acres of modeled core habitat under the IUDA or the MUDA, respectively (see Table 5-13 in the HCP/NCCP), and 1,820 acres of modeled low-use habitat for San Joaquin kit fox in the action area with the IUDA. Core or primary habitat, as well as secondary or foraging habitat, is defined in Appendix D of the HCP/NCCP. A network of core preserves will protect a critical linkage for San Joaquin kit fox between its range outside Contra Costa County and most known locations in Contra Costa County based on past sightings. The Preserve System will include the most important movement routes and core habitat for San Joaquin kit fox by preserving 2,400 acres of annual grassland in Horse, Lone Tree, and Deer Valleys. The Preserve System will also include an important movement route for San Joaquin kit fox between Alameda County and Contra Costa County by protecting at least 4,300 acres of annual grassland and at least 750 acres of alkali grassland between the County line, the Byron Airport Habitat Mitigation Lands, and the Los Vaqueros Watershed.

Minimization
Development guidelines will ensure that impacts on this species from covered activities are avoided or minimized (Conservation Measures 1.6 and 1.9). Prior to submission of an application for coverage under the HCP/NCCP, planning surveys will identify active breeding habitat or denning sites for kit fox. Preconstruction surveys are required in areas with burrows or dens. Destruction of occupied dens is prohibited. Protocols are in place for avoiding injury to individuals (Chapter 6, Section 6.3.3).

Management Actions
Annual grassland within preserves will be managed to enhance small-mammal populations (a prey base for kit fox) (Conservation Measure 2.5).

Tricolored Blackbird

Preservation
The Preserve System will protect approximately 126 or 164 acres of modeled core habitat and 16,747 or 20,138 acres of primary foraging habitat under the IUDA or MUDA, respectively (see Table 5-13 in the HCP/NCCP).

Minimization
Development guidelines ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.9, and 1.10). Project approvals must require avoidance of occupied nests during the breeding season.

Management Actions
In addition to land preservation, Conservation Measures 2.2 and 2.3 (see Chapter 5) benefits tricolored blackbird by enhancing, restoring, and creating suitable breeding habitat adjacent to suitable foraging habitat (annual grassland). At least 25% of the estimated 85 acres of perennial wetlands restored will provide suitable breeding habitat for blackbirds. These wetlands will be located at least 1 mile from black-crowned night heron colonies that are known at the time, and within flight distance of foraging habitat (Conservation Measure 3.2). Habitat enhancement on agricultural lands (e.g., planting blackberries or other vegetation along ditches and canals to provide suitable nesting sites) benefits tricolored blackbird.

Golden Eagle

Preservation
The Preserve System will protect an estimated 24,321 or 29,267 acres of modeled foraging habitat for golden eagle under the IUDA or MUDA, respectively (see Table 5-13 in the HCP/NCCP), including a network of large blocks of high-quality grassland habitat. Occupied habitat that is considered threatened is a high priority for acquisition and management (Conservation Measure 3.3).

Minimization
Conservation Measures 1.6, 1.9, and 1.10 ensures that impacts on this species from covered activities are avoided. (This Plan does not cover wind farms, but wind farms will be retired when feasible.) Conservation Measure 1.11 prohibits the take of individual golden eagles. Project approvals must avoid occupied nests during the breeding season. A 0.5-mile buffer will be established around active nest sites. A smaller buffer could be could be implemented should site-specific conditions warrant. The IE will coordinate with the Service and DFG to determine the appropriate buffer size.

Management Actions
Preserves will be managed to enhance the prey base for raptors, including golden eagles (Conservation Measure 2.5). Annual grassland that is managed to decrease the cover and extent of exotic plants (Conservation Measure 1.4) and to increase the cover and extent of native grasslands through grazing and other means (Conservation Measures 1.2 and 2.4) will benefit golden eagles by decreasing escape cover in grasslands. Management of agricultural lands will be designed to enhance and increase foraging and nesting habitat for Covered Species, including golden eagle (Conservation Measures 1.3 and 2.11). These measures contain specific techniques and goals that will be incorporated into agricultural management plans and conditions of the conservation easements purchased on agricultural lands.

Western Burrowing Owl

Preservation
The conservation strategy will protect an estimated 16,675 or 19,844 acres of modeled habitat for western burrowing owl under the IUDA or the MUDA, respectively (see Table 5-13 in the HCP/NCCP). New linkages will be created in blocks of habitat suitable for western burrowing owl to facilitate dispersal and colonization throughout the Preserve System, colonization of the action area from adjacent areas, and dispersal from inside to outside the action area.

Minimization
Development guidelines ensure that impacts on this species from covered activities are avoided or minimized (Conservation Measures 1.6 and 1.9). Planning and preconstruction surveys are required in areas with burrows. Destruction of occupied burrows is prohibited (Chapter 6, Section 6.3.3).

Management Actions
Conservation Measures 1 2.5 enhances habitat quality for western burrowing owl in preserves by increasing availability of burrows and prey base by enhancing small-mammal populations. Conservation Measure 3.4 will temporarily create artificial burrows in grasslands to attract and retain burrowing owls and Conservation Measure 3.5 will install temporary perches to attract and retain burrowing owls.

Swainson's Hawk

Preservation
The Preserve System will protect an estimated 12 or 16 acres of modeled breeding habitat and 2,096 or 2,757 acres of modeled foraging habitat under the IUDA or the MUDA, respectively (see Table 5-13 in the HCP/NCCP). Nesting habitat is a priority for acquisition. In addition, the loss of riparian woodland/scrub, all of which is considered suitable nesting habitat for Swainson's hawk, will be mitigated through in-kind protection of riparian woodland (Conservation Measure 1.1) and enhancement and restoration of riparian woodland/scrub within preserves (Conservation Measures 2.9 and 2.10).

Minimization
Project approvals must require avoidance of occupied nests during the breeding season. Development guidelines ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6 and 1.9). Prior to submission of an application for coverage under the HCP/NCCP, planning surveys will identify potentially active Swainson's hawk nest sites. Preconstruction surveys are required in areas with active nests. Destruction of occupied nests is prohibited, and buffer zones during the nesting season are required (Chapter 6, Section 6.3.3).

Management Actions
Up to 55 additional acres of riparian woodland/scrub will be restored. Preserves will be managed to enhance the prey base for raptors (Conservation Measure 2.5). Annual grassland that is managed to decrease the cover and extent of exotic plants (Conservation Measure 1.4) and to increase the cover and extent of native grasslands (Conservation Measures 1.2 and 2.4) will benefit Swainson's hawks by reducing overall escape cover for prey. Management of agricultural lands will increase foraging and nesting habitat for Swainson's hawks (Conservation Measures 1.3 and 2.11). These will be incorporated into agricultural management plans and conditions of the agricultural conservation easements purchased on these lands.

Silvery Legless Lizard

Preservation
The conservation strategy will protect an estimated 153 or 166 acres of modeled habitat for silvery legless lizard in the action area under the IUDA or the MUDA, respectively (see Table 5-13 in the HCP/NCCP), including all modeled habitat for silvery legless lizard in Subzones 2a and 2e.

Minimization
Several Preserve and recreation measures as well as urban-wildland guidelines will be implemented to avoid or minimize impacts on silvery legless lizards and modeled habitat (particularly soils) in preserves (Conservation Measure 1.5, 1.2, 1.8, and 1.9). Restrictions on recreation in protected habitat minimizes disturbance to the species (Conservation Measure 1.5). Pesticide use, which threatens this species by affecting its insect prey base, will be controlled in preserves (Conservation Measure 1.2). Buffers between protected habitat and the urban edge will benefit silvery legless lizard by discouraging intrusion by domestic predators (Conservation Measures 1.8 and 1.9).

Alameda Whipsnake

Preservation
The Preserve System will protect an estimated 1,690 or 1,817 acres of core and perimeter habitat and 10,564 or 12,166 acres of upland movement habitat, under the IUDA or the MUDA,

respectively (see Table 5-13 in the HCP/NCCP), and 46 miles of stream movement habitat for Alameda whipsnake under the IUDA.

Minimization
Development guidelines ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.9, and 1.10). Control of exotic plants (Conservation Measure 1.4) and recreational uses (Conservation Measure 1.5) benefits or minimizes impacts to Alameda whipsnake. Recreational controls include prohibiting bicycles in core whipsnake habitat and prohibiting construction of new trails in suitable core habitat.

Management Actions
Movement habitat for Alameda whipsnake will be enhanced through better management of oak woodland, oak savanna, and annual grassland (Conservation Measures 1.2, 2.4, and 2.6). Management of chaparral/scrub (Conservation Measure 2.8) will be conducted to minimize impacts on Alameda whipsnake but still provide the diversity of successional stages that are likely necessary to support the species. These conservation measures are consistent with measures discussed in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (Service 2002a). According to the recovery plan, recovery of Alameda whipsnake populations requires a combination of long-term research/management and immediate management actions. Incompatible land uses include fire suppression, off-road vehicle use, grazing practices, and mining. Conservation measures described by the recovery plan for Alameda whipsnake include protecting existing populations and experimenting with the reestablishment of disturbance regimes, especially fire.

Giant Garter Snake

No records of giant garter snake have been documented within the action area2. However, modeled habitat occurs in the sloughs and drainage network associated with agricultural fields in the northeast and eastern section of the County (Service 1999).

Preservation
The IE will acquire conservation easements on at least 250 acres of cropland or pasture within Zone 6. The conservation strategy will protect an estimated 1 or 3 miles of modeled core habitat for giant garter snake in the action area under the IUDA or the MUDA, respectively (see Table 5-13 in the HCP/NCCP), and approximately 72 acres of slough/channel habitat will be created or restored. The HCP/NCCP requires that suitable upland and aquatic habitat that are removed as a result of covered activities be replaced at a ratio of 1:1 to 3:1 according to Service guidelines (see Conservation Measure 3.6).

Minimization
Development guidelines ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.9, and 1.10). Planning and preconstruction

2 The lack of records from the action area may be due to a lack of survey effort.

surveys are required in areas with giant garter snake habitat. Seasonal restrictions or buffer zones are required (Chapter 6, Section 6.3.3).

Management Actions
Land acquired near Dutch Slough will prioritize the restoration of modeled habitat for giant garter snake. The amount of restoration in these areas is undetermined because it is directly linked to impacts, but up to 72 acres of slough/channel restoration could occur in the action area if suitable restoration sites are found (see Conservation Measure 2.3 of the Plan).

These conservation measures are consistent with measures discussed in the *Draft Recovery Plan for the Giant Garter Snake* (Service 1999). Tasks emphasized in the recovery plan are (1) habitat protection, (2) habitat management and restoration, (3) surveying and monitoring, and (4) research. Protection and restoration of modeled habitat are components of the recovery plan. Surveying and monitoring for all Covered Species will be accomplished as described in Chapter 7. Additional funds are allocated for guided research within the Preserve System that may go towards understanding the distribution of garter snakes in the Action Area. Collectively, the conservation measures addressed by the ECCC HCP/NCCP support these recovery tasks.

Western Pond Turtle

Preservation
The Preserve System will protect an estimated 675 or 873 acres of non-stream core habitat under the IUDA or MUDA, respectively. In addition, the Preserve System will protect an estimated 1,715 or 1,956 acres of upland movement habitat (see Table 5-13 in the HCP/NCCP). Six or 7 miles of core stream habitat and 80 or 92 miles of stream habitat that may be used for dispersal by pond turtles will be protected. To mitigate impacts on habitat for western pond turtle and other aquatic species, the IE will acquire aquatic habitats in kind within preserves at the ratios in Table 5-5 of the HCP/NCCP.

Minimization
Development guidelines, including stream setbacks, ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.7, 1.9, and 1.10).

Management Actions
Mitigation includes creation, restoration, or enhancement of aquatic land-cover types, including creation of habitat for juvenile turtles, as described in Conservation Measures 2.2 and 2.3. Because western pond turtle requires both aquatic and upland habitats, enhancement of wetlands or ponds to compensate for loss of habitat will occur adjacent to suitable and accessible upland habitat (extending at least 300 feet from the edge of wetlands or ponds), which will be protected.

In addition, artificial basking substrate and woody debris will be added to ponds that otherwise lack suitable basking sites to enhance habitat for western pond turtles (see Conservation Measure 3.7 in Chapter 5 of the Plan).

California Tiger Salamander

Preservation
The Preserve System will protect an estimated 96 or 111 acres of modeled breeding habitat with the IUDA and MUDA, respectively (see Table 5-13 in the HCP/NCCP). In addition, the Preserve System will protect an estimated 24,047 or 28,751 acres of migration/aestivation habitat under each permit scenario (see Table 5-13 in the HCP/NCCP). New linkages will be created in blocks of modeled habitat to facilitate dispersal and colonization throughout the action area. To compensate for loss of habitat for California tiger salamander and other aquatic species, the IE will acquire aquatic habitats in kind within preserves at the ratios shown in Table 5-5 in the HCP/NCCP.

Minimization
Development guidelines ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.9, and 1.10). Surveys for suitable breeding habitat will be conducted prior to submission of application for coverage under the HCP/NCCP. The Service and DFG will be notified of any suitable breeding habitat to be filled prior to construction to allow salvage of juveniles (see Chapter 6, Section 3.6.6).

Management Actions
Conservation Measure 2.2 will manage wetlands and ponds to increase hydro-geomorphic and ecological functions and improve habitat for California tiger salamander. Conservation Measure 2.3 will restore wetlands and ponds according to the ratios described in Tables 5-16 and 5-17 in the HCP/NCCP. This measure provides a net increase in wetland and pond area, function and values.

California Red-Legged Frog

Preservation
The Preserve System will protect an estimated 28 or 36 acres of modeled non-stream breeding habitat, 85 or 98 miles of stream breeding habitat, and 24,455 or 29,467 acres of upland movement habitat with the IUDA and MUDA, respectively (see Table 5-13 in the HCP/NCCP and Conservation Measure 1.1). New linkages will be created in blocks of modeled habitat to facilitate dispersal and colonization throughout the action area.

Minimization
Development guidelines, including stream setbacks, ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.7, 1.9, and 1.10). Planning surveys for suitable breeding habitat will be conducted prior to submission of application packages for coverage under the HCP/NCCP. The Service and DFG will be notified of any suitable breeding habitat to be filled prior to construction to allow salvage of juveniles (see Chapter 6, Section 3.6.6).

Management Actions
Conservation Measure 2.2 will manage wetlands and ponds to increase hydrogeomorphic and ecological functions and improve habitat for California red-legged frog. Conservation Measure 2.3 will restore wetlands and ponds according to the ratios described in Tables 5-16 and 5-17 in the HCP/NCCP. This measure provides a net increase in wetland and pond area, function and values.

The conservation measures described above are consistent with measures discussed in the *Recovery Plan for the California red-legged frog* (*Rana aurora draytonii*) (Service 2002b). The recovery plan calls for the preservation of habitat, the establishment of a viable metapopulation, development of effective land-use policies and guidelines, continued research on the ecological requirements of California red-legged frogs necessary for conservation, continued monitoring, and the establishment of an outreach program.

Foothill Yellow-Legged Frog

Preservation
Streams within the Preserve System will be preserved incidentally when land is acquired. In addition, preservation of streams will be accomplished according to stream type. Impacts on perennial streams, including suitable foothill yellow-legged frog habitat, will be mitigated at a preservation ratio of 2:1 (see Table 5-5 in the HCP/NCCP). It is estimated that 5.2 or 5.6 miles of streams will be preserved and 0.6 or 0.8-mile of stream will be restored within the IUDA and MUDA, respectively.

Minimization
Development guidelines, including stream setback requirements, ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.7, 1.9, and 1.10).

Management Actions
Stream restoration will be attempted through the restoration of existing streams (e.g., creating meanders in channelized streams, removing concrete lining) but may be accomplished out of kind (see Conservation Measures 2.3 and 2.10). Where in-kind restoration is not technically feasible as determined by the IE in consultation with the Corps and Regional Water Board, restoration will be achieved out-of-kind using a system of functional units to ensure that functions of restored waters are greater than the functions of waters lost (see Appendix J of the HCP/NCCP). Restoration compliance for impacts on perennial streams can be accomplished through enhancement of riparian woodland/scrub, which will be designed to support the life-history requirements of covered aquatic species, including foothill yellow-legged frog.

Longhorn Fairy Shrimp, Vernal Pool Fairy Shrimp, Midvalley Fairy Shrimp, Vernal Pool Tadpole Shrimp

Preservation
The Preserve System will protect an estimated 129 or 168 acres of seasonal wetland in the action area under the IUDA or the MUDA, respectively, much of which is likely suitable for covered invertebrates. Priority is given to acquiring sites with modeled habitat for vernal pool invertebrates, including rock outcrops and basins that provide habitat for longhorn fairy shrimp and vernal pool fairy shrimp.

Minimization
The HCP/NCCP ensures that impacts on these species from covered activities are avoided or minimized (see Conservation Measure 2.12). Applicants who fill vernal pools must determine if the pools provide modeled habitat for covered shrimp. If surveys show absence of covered shrimp (see Section 6.3.3), applicants will mitigate for impacts according to Conservation Measure 2.3 for seasonal wetlands. Project proponents are required to conduct Service protocol surveys in one year (rather than two) to determine presence or absence of listed shrimp species. If vernal pools are occupied by covered shrimp, applicants must compensate for impacts to these vernal pools according to this measure.

Management Actions
Ponds will be managed within the Preserve System to benefit Covered Species and restore an estimated 104 or 163 acres of seasonal wetland complexes in preserves under the IUDA or the MUDA, respectively (see Tables 5-16 and 5-17 in the HCP/NCCP and Conservation Measures 2.2 and 2.3). Restored vernal pools will be evaluated to determine if covered vernal pool crustaceans are present at frequencies similar to those in natural vernal pool complexes. If not, the feasibility of transplanting species from occupied pools to restored pools to establish new populations will be assessed.

A *Recovery Plan for Vernal Pool Species of California and Southern Oregon* (Service 2005) calls for protection of habitat in core areas, the use of geographic information systems (GIS) to refine conservation priorities, habitat restoration, the development of survey and monitoring protocols, research, development of cooperative programs, and outreach and education. The HCP/NCCP supports these overall goals and specifically contributes to protection of habitat, habitat restoration and the development of cooperative programs.

Covered Plant Species

The discussions of covered plant species below include estimates of the area of habitat that will be protected by the HCP/NCCP. These estimates may appear very large relative to the number of documented occurrences of a given species. For example, there are 56,356 acres of modeled habitat for big tarplant in the action area, but only five documented occurrences outside public lands or open space. This discrepancy is due to two factors: 1) lack of survey effort in the action area, and 2) modeling limitations. Botanical surveys have not been conducted in large portions

of the action area, and it is likely that there are numerous occurrences of covered plant species present in the area that are undocumented. In addition, the habitat acreage estimates are based on habitat models that were formulated using the best available data. However, these habitat models are limited in their accuracy due to the lack of information about species microhabitat requirements, as well as limitations on land-cover mapping. Therefore, the acreages of habitat protected noted below are likely overestimates.

Mt Diablo Manzanita

Preservation
The two known occurrences of Mount Diablo manzanita in the action area outside public lands will be protected by the Preserve System (Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). Moreover, an estimated 414 or 447 acres of modeled habitat for Mount Diablo manzanita will be protected within the Preserve System under the IUDA and MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes from 56% to 61% of the remaining species habitat that is available for preservation.

Minimization
Take of Mount Diablo manzanita will not be permitted by the HCP/NCCP unless new occurrences (a population or portion of a population) are protected in the Preserve System.

Management Actions
Management of HCP/NCCP preserves will benefit Mount Diablo manzanita. Public access to known populations of Mount Diablo manzanita within preserves will be restricted to make illegal collection more difficult (Conservation Measure 1.53). Vegetation management actions, including prescribed burning (Conservation Measures 1.2 and 2.8), ensures that the condition of the chaparral vegetation community that supports Mount Diablo manzanita will be maintained. Management in other areas has shown that Mount Diablo manzanita produces high densities of seedlings following prescribed burning in late summer or fall (M. A. Showers pers. comm.). If necessary, experimental management techniques will be applied to populations of this species within preserves to determine the best means to enhance population health and viability (Conservation Measure 3.9). These conservation measures are consistent with measures discussed in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (Service 2002a) for chaparral habitats in the San Francisco Bay Area. The Draft Recovery Plan does not address any of the plant species covered by this HCP/NCCP specifically. However, it does prescribe a community-level conservation strategy that is comprised of habitat protection, adaptive management, monitoring, and threat reduction. Specific measures include studying the use of prescribed fire and controlling invasive species. The conservation strategy and specific measures described in the Draft Recovery Plan are similar to those in the HCP/NCCP.

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3 Conservation Measure 1.5 requires the Implementing Entity to prepare and implement a Recreation Plan for the Preserve System. The required guidelines include the prohibition of public collecting of native species and restricting use or access due to problems with over collecting of sensitive species.

Brittlescale

Preservation
Two of the five known occurrences of brittlescale in the action area that are not already in protected lands will be brought under protection by the Preserve System (Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). In addition, an estimated 577 or 697 acres of modeled habitat for brittlescale will be protected within the Preserve System under the IUDA and MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes from 49% to 60%, respectively, of the species habitat in the action area that is available for preservation.

Minimization
One occurrence of brittlescale may be removed by covered activities. Take of no more than two additional occurrences is allowed under the IUDA unless additional occurrences are protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP preserves will benefit brittlescale. Reduction of grazing in alkali grassland and other vegetation management techniques within alkali grassland and alkali wetlands (Conservation Measures 2.1, 2.2, 2.4, and 2.12) will benefit brittlescale by maintaining or enhancing modeled habitat for this species. In addition, between 61 and 67 acres of alkali wetlands will be restored within preserves (see Tables 5-16 and 5-17 in the HCP/NCCP). One objective of alkali wetland restoration is to restore modeled habitat for brittlescale (e.g., in alkali meadows).

San Joaquin Spearscale

Preservation
This species often co-occurs with brittlescale, so it is anticipated that protection of modeled habitat for the species will be largely coincidental with protection of modeled habitat for brittlescale. An estimated 900 or 1,250 acres of alkali grassland, and 84 or 93 acres of alkali wetland will be protected within the Preserve System under the IUDA and MUDA, respectively (see Table 5-12 in the HCP/NCCP). No species distribution model was developed for San Joaquin spearscale because of the difficulty in predicting the species' occurrence relative to conditions that could be mapped at a regional scale.

Minimization
Take of San Joaquin spearscale will not be permitted by the HCP/NCCP unless at least one additional occurrence is protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP preserves will benefit San Joaquin spearscale. Although the habitat requirements of this species are poorly understood, it is thought that vegetation management within alkali grassland and alkali wetlands (Conservation Measures 2.1, 2.2, 2.4, and 2.12), including reduction of grazing in alkali grassland, will benefit San Joaquin spearscale. In addition, between 61 and 67 acres of alkali wetlands will be restored within preserves (see Tables 5-16 and 5-17 in the HCP/NCCP). One objective of alkali wetland protection is to protect additional modeled habitat for San Joaquin spearscale (e.g., in alkali meadows).

Big Tarplant

Preservation
One population of big tarplant is expected to be lost to covered activities. However, three of the remaining five known occurrences of big tarplant in the action area outside public lands will be protected by the Preserve System (see Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). In addition, an estimated 9,300 or 11,395 acres of the modeled species range will be protected within the Preserve System under the IUDA and the MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes from 48% to 59%, respectively, of the species range in the action area available for preservation.

Minimization
One occurrence of big tarplant may be removed by covered activities. Take of no more than 1 additional occurrence is allowed under HCP/NCCP unless additional occurrences are protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP Preserves will benefit big tarplant. For example, Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves. Vegetation management and enhancement within grasslands (Conservation Measure 2.4), including prescribed burning, will benefit big tarplant by maintaining or enhancing modeled habitat for this species.

Mount Diablo Fairy Lantern

Preservation
The one known occurrence of Mount Diablo fairy lantern in the action area outside public lands will be protected by the Preserve System, if this occurrence is still extant (see Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). Moreover, an estimated 11,178 or 13,360 acres of the modeled species range will be protected within the Preserve System under the IUDA and the MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes from 43% to 54%, respectively, of the species range in the action area available for preservation.

Minimization
Take of Mount Diablo fairy lantern will not be permitted by the HCP/NCCP unless at least one additional occurrence is protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP preserves will benefit Mount Diablo fairy lantern. For example, Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves to minimize possible competition with this species. Conservation Measure 1.5 requires the preparation of system-wide recreation plan that will limit public access to minimize collection of the species. Vegetation management and enhancement within native grassland, oak savanna/woodland, and chaparral will benefit Mount Diablo fairy lantern by maintaining or enhancing modeled habitat for this species. For example, promoting canopy gaps within chaparral patches (Conservation Measure 2.8) will maintain or increase habitat for this species. In addition, leaving snags and dead trees in place in oak woodland (Conservation Measure 2.6) will create openings that will maintain or enhance habitat for this species. Between 42 and 165 acres of oak savanna will be restored within preserves, which will provide additional modeled habitat for Mount Diablo fairy lantern. These measures are consistent with community-level conservation measures discussed in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (Service 2002a).

Recurved Larkspur

Preservation
Two of the remaining three known occurrences of recurved larkspur in the action area outside public lands will be brought under protection by the Preserve System (see Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). Moreover, an estimated 389 or 1,064 acres of the modeled range for this species will be protected within the Preserve System under the IUDA and the MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes from 23% to 62%, respectively, of the species range available for preservation.

Minimization
One occurrence of recurved larkspur may be removed by covered activities. No additional take is allowed under HCP/NCCP unless additional occurrences are protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP Preserves will benefit recurved larkspur. For example, Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves.

Vegetation management and enhancement within alkali grassland (Conservation Measures 2.1, 2.4, 2.2, and 2.12), including reducing grazing in alkali grasslands, will benefit recurved larkspur by maintaining or enhancing modeled habitat for this species.

Round-Leaved Filaree

Preservation
Two of the seven known occurrences of round-leaved filaree in the action area outside public lands will be brought under protection by the Preserve System (see Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). Because the location of several of the eight documented occurrences is not well known and there have been few surveys for this species in the area, it is expected that more than two occurrences would be protected in the Preserve System. An estimated 2,877 or 2,997 acres of the primary habitat for this species will be protected within the Preserve System under the IUDA and the MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes from 50% to 52%, respectively, of the primary habitat in the action area available for preservation.

Minimization
Two occurrence of round-leaved filaree may be removed by covered activities. Take of no more than two additional occurrences is allowed under HCP/NCCP unless additional occurrences are protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP Preserves will benefit round-leaved filaree. For example, Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves; increases in the cover of exotic grasses may have contributed to the decline of round-leaved filaree (Gillespie 2003). Vegetation management and enhancement within grasslands (Conservation Measure 2.4), such as reducing grazing in some areas, will benefit round-leaved filaree by maintaining or enhancing modeled habitat for this species. Overgrazing is a threat to some occurrences of this species (Gillespie 2003, California Native Plant Society (CNPS) 2005).

Diablo Helianthella

Preservation
Both known occurrences of Diablo helianthella in the action area outside public lands will be brought under protection by the Preserve System (see Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). Moreover, the Preserve System will protect an estimated 6,168 or 7,250 acres of the modeled suitable range for this species under the IUDA and MUDA, respectively. This protected land constitutes 46% to 54% of the species range in the action area available for preservation (see Table 5-12 in the HCP/NCCP).

Minimization
Take of Diablo helianthella will not be permitted by the HCP/NCCP unless at least one additional occurrence is protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of HCP/NCCP Preserves will benefit Diablo helianthella. For example, Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves. Implementation of a Preserve Recreation Plan (Conservation Measure 1.5) will minimize additional impacts to the species from trail construction and maintenance and off-trail travel, which have been noted as threats to documented occurrences (California Natural Diversity Database (CNDDB) 2005). Vegetation management and enhancement within oak savanna/woodland (Conservation Measures 2.1 and 2.6) and chaparral (Conservation Measures 2.1 and 2.8) will benefit Diablo helianthella by maintaining or enhancing modeled habitat for this species. For example, promoting canopy gaps within chaparral patches (Conservation Measure 2.8) will maintain or increase habitat for this species. In addition, leaving snags and dead trees in place in oak woodland (Conservation Measure 2.6) will create openings that will maintain or enhance habitat for this species. Between 42 and 165 acres of oak savanna will be created or restored in the Preserve System (see Tables 5-16 and 5-17 in the HCP/NCCP). One objective of oak savanna restoration is to provide additional modeled habitat for Diablo helianthella. These measures are consistent with community-level conservation measures discussed in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (Service 2002a).

Brewer's Dwarf Flax

Preservation
One of the two known occurrences of Brewer's dwarf flax in the action area outside public lands will be brought under protection by the Preserve System (see Table 5-20 in the HCP/NCCP and Conservation Measure 1.1). Approximately 9,337 or 10,704 acres of the modeled suitable range for this species will be protected within the Preserve System under the IUDA and MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes 48% to 55% of the species range available for preservation.

Minimization
Take of Brewer's dwarf flax will not be permitted by the HCP/NCCP unless at least one additional occurrence is protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Management of Preserves will benefit Brewer's dwarf flax. For example, Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves. Implementation of a Preserve Recreation Plan (Conservation Measure 1.5) will minimize additional impacts to the species from trail construction and maintenance and foot traffic, which have been noted as threats to documented occurrences (CNDDB 2005). Vegetation management and enhancement within native grassland (Conservation Measures 2.1 and 2.4), oak savanna/woodland (Conservation Measures 2.1 and 2.6), and chaparral (Conservation Measures 2.1 and 2.8) will benefit Brewer's dwarf flax by maintaining or enhancing modeled habitat for this species. For example, promoting canopy gaps within chaparral patches (Conservation Measure 2.8) will maintain or increase habitat for this species. Between 42 and 165 acres of oak savanna will be created or restored in the preserve system (see Tables 5-16 and 5-17 in the HCP/NCCP and Conservation Measure 2.7). One objective of oak savanna restoration is to provide additional modeled habitat for Brewer's dwarf flax. These measures are consistent with community-level conservation measures discussed in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (Service 2002a).

Showy Madia

Preservation
Approximately 13,000 or 16,500 acres of the annual grassland will be protected within the Preserve System under the IUDA and MUDA, respectively (see Table 5-12 in the HCP/NCCP). Five-hundred acres of oak savanna and 400 acres of oak woodland will be protected in either development scenario. This protected land constitutes 41–56% of grassland, 17% of oak savanna, and 3% of oak woodland of the species range available for preservation.

Minimization
Completion of planning surveys ensures that botanical surveys will be conducted in potential impact areas and that high-quality populations will be avoided. Take of showy madia will not be permitted by the HCP/NCCP unless at least one occurrence is protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Many of the landscape-level and community-level conservation measures will directly benefit showy madia if the species is found within HCP/NCCP Preserves. Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves. Vegetation management and enhancement within native grassland (Conservation Measures 2.1 and 2.4), including reducing grazing in some areas, and oak savanna (Conservation Measures 2.1 and 2.6) may also benefit showy madia by maintaining or enhancing potential habitat for this species. Between 42 and 165 acres of oak savanna will be created or restored in the preserve system (see Tables 5-16 and 5-17

in the HCP/NCCP and Conservation Measure 2.7). Oak savanna restoration may provide additional habitat for showy madia.

Adobe Navarretia

Preservation
One of the three known occurrences of adobe navarretia in the action area outside public lands will be brought under protection by the Preserve System (see Table 5-20 and Conservation Measure 1.1 in the HCP/NCCP). Approximately 13,000 or 16,500 acres of modeled annual grassland will be protected within the Preserve System under the IUDA and MUDA, respectively (see Table 5-12 in the HCP/NCCP). This protected land constitutes 41–56% of the species range available for preservation.

Minimization
Completion of planning surveys will ensure that botanical surveys will be conducted in potential impact areas and that high-quality populations will be avoided. One occurrence of adobe navarretia may be removed by covered activities. Take of no more than one additional occurrence is allowed under HCP/NCCP unless additional occurrences are protected in the Preserve System. Additional take will be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP).

Management Actions
Many of the landscape-level and community-level conservation measures will directly benefit adobe navarretia, if it is found in HCP/NCCP preserves. Conservation Measure 1.4 ensures that exotic plants will be controlled within preserves. Vegetation management and enhancement within native grassland (Conservation Measures 2.1 and 2.4) and wetlands (Conservation Measure 2.2) may benefit adobe navarretia by maintaining or enhancing potential habitat for this species. The conservation measures noted above calls for the introduction of grazing in some areas to reduce exotic plant cover, and the reduction of grazing in other areas to allow development of seasonal wetland vegetation. Feral pigs, which have been noted as a threat to vernal pool plant species, will be excluded from seasonal wetlands where they appear to be damaging native vegetation. In addition to restoration of seasonal wetlands for mitigation of impacts to this habitat type, 20 acres of seasonal wetlands will be restored to contribute to recovery of adobe navarretia and other Covered Species (Conservation Measure 2.3). These measures are consistent with ecosystem-level conservation measures discussed in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005). The Recovery Plan does not address any of the plant species covered by this HCP/NCCP specifically. However, it does prescribe a community-level conservation strategy that includes habitat protection, adaptive management, and monitoring, and ongoing research. Specific measures include grazing and controlling invasive species. The conservation strategy and specific measures described in the Recovery Plan are consistent with those in the HCP/NCCP.

No Take Plants

The HCP/NCCP includes requirements for applicants for coverage under the ITP to demonstrate complete avoidance of six plant species that are either extremely rare or thought to be extinct in the action area: Contra Costa goldfields (*Lasthenia conjugens*), large-flowered fiddleneck (*Amsinckia grandiflora*), alkali milkvetch (*Astragalus tener* ssp. *tener*), Mount Diablo buckwheat (*Eriogonum truncatum*), diamond-petaled poppy (*Eschscholzia rhombipetala*), and caper-fruited tropidocarpum (*Tropidocarpum capparideum*). Applicants must demonstrate avoidance of these species by conducting surveys for these species at the appropriate time of year. If found, they are required to be fully avoided. This conservation measure ensures that the covered activities would not jeopardize the continued existence of these six plants.

IMPLEMENTATION OF THE PROPOSED HCP

Funding

Natural Community Conservation Plans are required to conserve species and their habitats ("conserve" is defined by the California Fish and Game Code as contributing to the recovery of species). Therefore, the conservation strategy for this plan exceeds typical mitigation requirements. Although the Plan provides a single conservation strategy to mitigate impacts and conserve Covered Species, an additional analysis has been carried out to separate the mitigation obligations of the Plan from the conservation components.

As part of this analysis, the land-acquisition requirements for terrestrial land-cover types were assigned to either a mitigation component (i.e., acquisition required by the Plan as a result of covered activities) or a conservation component (i.e., acquisition required by the HCP/NCCP to contribute to species' recovery) based on a "fair share" analysis. This analysis considers the pace of open-space acquisition relative to the pace of development before and after adoption of the HCP/NCCP and assigns the land-acquisition requirements of the HCP/NCCP according to the premise that future development should mitigate impacts in the action area proportionate to its share of the overall impacts in the action area (i.e., impacts in the past and the future). The analysis takes into account the fact that cultivated agriculture removes some, but not all, biological and open space values from a site. According to the analysis, new development is responsible for 52% of the land acquisition requirements under the MUDA, and existing development (i.e., the public) is responsible for 48% of the land acquisition in the Plan. The fair-share analysis cannot be applied to wetland land-cover types. Wetland impacts are already clearly separated by mitigation and conservation components on the basis of other factors (see Tables 5-5, 5-16, and 5-17 in the HCP/NCCP). This analysis is described in more detail in Chapter 9 and Appendix G of the HCP/NCCP.

This analysis facilitates eligibility for public grant funding and supports the distinction between mitigation and conservation necessary for this biological opinion. However, the HCP/NCCP is a single plan that must be implemented as a whole. Permits will be issued on the basis of implementation of the entire Plan. The developer-based mitigation fees and other local funding

described in Chapter 9 of the HCP/NCCP exceed the mitigation requirements of the IE. The remaining recovery goals of the conservation strategy will be met through a combination of state and federal contributions and from other funding from federal, state, and private competitive grants.

Funding Sources

The cost of implementing the HCP/NCCP during the 30-year permit term is estimated at $297,000,000 or $350,000,000 for the IUDA and MUDA, respectively. This includes the cost of land acquisition, HCP/NCCP administration, habitat management, habitat restoration, biological monitoring, remedial measures, and a 5% contingency.

Full funding during the permit term is guaranteed by the Permittees through the Implementing Agreement as described in Chapter 9 of the HCP/NCCP. There is a wide range of viable strategies available to fund the Plan after the permit term and in perpetuity to cover the long-term costs of preserve management, monitoring, and reduced program administration (see Table 9-9 in the HCP/NCCP). Although no single strategy has been selected at this time, the IE will secure all necessary commitments to implement this plan after the permit term before using 50% of all authorized take under the maximum urban development area (7,259 acres) or at the end of Year 15 of implementation, whichever occurs first (see Section 14 of the ECCA IA).

The HCP/NCCP addresses funding for post-permit management and monitoring. The IE will develop a detailed plan for long-term funding of operation and maintenance and secure all necessary commitments to implement this plan before using 50% of all authorized take under the maximum urban development area (= 50% of 14,518 acres or 7,259 acres) or at the end of Year 15 of implementation, whichever occurs first.

Funding to implement the HCP/NCCP will come from a variety of sources. These sources may be classified as fees on covered activities and non-fee public funding. Proponents of covered activities will pay a fee to receive permit coverage under the Plan. Non-fee public funding will either come from continued investment by local, state, and federal programs already funding conservation in this area or from existing state and federal sources reserved for areas with an approved HCP/NCCP.

<u>Fees on Covered Activities</u>

Mitigation for covered activities includes fees or land dedications and can be separate into the following categories:

Development Mitigation Fee

Additional Wetland Mitigation Fee

- Rural Road Fee
- Byron Airport Expansion

Temporary Impact Fee for impacts to wetland cover types

In the first year of HCP/NNCP implementation, developer fees will range from $5,960 per acre, for specific infill parcels less than 10 acres in size, to $23,838 per acre for parcels on natural land-cover types in specific mapped areas. Figure 9-1 in Chapter 9 of the HCP/NCCP shows the three zones and the fee-per-acre in each zone. Additional fees will be charged for impacts on jurisdictional wetlands that range from $58,140 per acre to $172,380 per acre, depending on the wetland type, to pay for the direct and substantial cost of wetland restoration. Each covered road project has its own pre-defined fee. Some covered activities that cause temporary impacts will also be subject to a fee (see Section 9.3.1, "Temporary Impact Fee"). All fees will be automatically adjusted annually using standard indexes to keep pace with inflation and expected increases in land costs. (The index used for inflation of land-acquisition cost is the Annual Home Price Index [HPI] for the Oakland-Fremont-Hayward, CA Metropolitan Division [MSAD] for the prior calendar year, published by the Federal Office of Federal Housing Enterprise Oversight. The index used to develop the non–land cost inflation is the Consumer Price Index for the San Francisco Bay Region.) Land may be contributed in lieu of fees.

Non-Fee Funding from Local, State, and Federal Sources

Non-fee public funding can only be used for portions of the HCP/NCCP that contribute to species recovery (not for mitigation). Local funding will take several forms, including continued investments in conservation by EBRPD and local land trusts. Federal and state funding sources will include Service grants under Section 6 of the Act, Wildlife Conservation Board grants, and state park and resource bond measures. Some of these federal and state funding sources are generally available throughout the state and nation, while others can only be used to implement an approved HCP/NCCP. Although not assumed in revenue projections, funding may be supplemented by future local funding measures for parks and open space.

Tables 9-1 and 9-2 in Chapter 9 of the HCP/NCCP summarize the estimated cost of HCP implementation. Table 9-8 provides a cost and funding overview of the HCP/NCCP.

Land Acquisition Process

The IE will establish the Preserve System through acquisition of land in fee title, conservation easement, mitigation banking, or land dedication. Lands will be acquired from willing sellers according to the procedures described below and in more detail in Chapter 5 of the HCP/NCCP. Land acquired will support functioning vegetation communities and Covered Species habitat and may contain sites suitable for restoration or creation of vegetation communities and habitat.

The land acquisition requirements are described in Conservation Measure 1.1 (Land Acquisition) under *Acquisition Requirements for Zones 1–6* and are summarized below:

Zone 1: In subzone 1a at least 85 acres of annual grassland will be acquired to protect the

ridgelines and headwaters of Willow Creek. At least 1,450 acres of annual grassland in Subzones 1b and 1c will be acquired that will provide a connection from Black Diamond Mine Regional Preserve (BDMRP) to Detachment Concord. In Subzone 1d 25% of the grassland will be acquired. There is no land acquisition requirement for 1e, however, if land is acquired it will be contiguous with other protected lands.

Zone 2: Sixty percent of Zone 2 will be acquired. Acquisitions in Subzone 2a will focus on the northeastern and southeastern corners to increase the size of the connection between BDMRP, Detachment Concord, and Clayton Ranch. In Subzone 2b or 2c or both, the acquisition must provide a connection that is 0.5 mile in with to provide a movement corridor for Alameda whipsnake, California red-legged frog and other covered species. Further acquisition requirements include the acquisition of at least seven of the 13 ponds in Subzone 2c, 90% of the remaining chaparral in Subzones 2a, 2b, and 2c (90% of 135 acres). In Subzone 2a, land will be acquired to protect the known population of Mt. Diablo manzanita. In Subzone 2f, land acquired to provide a movement corridor for San Joaquin kit fox, will also include the known occurrences of big tarplant and the known occurrence of round-leaved filaree in Deer Valley. In Subzone 2h, acquisitions must include the known occurrences of Mount Diablo manzanita and Brewer's dwarf flax. Subzone 2d acquisition must include the known occurrence of round-leaved filaree. In subzones 2a, 2e, and 2h, if preacquisition surveys show suitable habitat for silvery legless lizard, these parcels will rank high for acquisition. Land that support suitable habitat for vernal pool invertebrates will be required wherever possible.

Zone 3: At least 90% of the 177 acres of chaparral/scrub modeled as suitable core habitat for the Alameda whipsnake will be acquired in Subzone 3a. This is the largest block of chaparral/scrub habitat outside of existing public lands. All lands acquired in Subzone 3a must contribute to the linkage between the chaparral/scrub habitat and other chaparral patches in Mount Diablo State Park. Further, the land acquisition must contribute to that linkage and be connected to Clayton Ranch through existing protected lands or HCP/NCCP preserves. There will be no acquisition requirements in Subzones 3b and 3c.

Land acquisition requirements in Zones 4, 5 and 6 vary according to the amount of urban development that is permitted under the HCP/NCCP. The following describes the acquisition targets for Zones 4, 5, and 6 according to the IUDA and MUDA.

Zone 4: Land acquisition will be focused along areas of Marsh Creek in the Briones Valley (Subzone 4d) and upstream in Subzone 4c, and the Upper Marsh Creek Subbasin located in Subzones 4a, 4c, 4e, 4f, 4g, and 4h. Subzone 4d acquisitions will protect movement routes for San Joaquin kit fox, and protect breeding habitat for western burrowing owl, California tiger salamander, and California red-legged frog. Subzones 4c and 4d contain 103 acres of the available riparian woodland/scrub. Subzone 4b has no land acquisition requirements because of extensive ranchette development. At least 270 acres of chaparral/scrub (of 435 acres) will be acquired in Zone 4. In Subzone 4h, acquisitions must link the Morgan Territory Ranch, which is protected by a conservation easement, with Morgan Territory Regional Preserve and Mount Diablo State Park. In Subzone 4a and 4h, at least 90% of the 222 acres of modeled Alameda

whipsnake habitat will be acquired. Under the IUDA acquisition in Subzone 4c must focus only on the riparian woodland/scrub habitat along March Creek or areas suitable for riparian woodland/scrub restoration. In Subzones 4f and 4a the two known occurrence of Brewer's dwarf flax must be acquired. In Subzone 4a, the known occurrence of Diablo helianthella must be acquired. In Subzone 4b, the known occurrence of Mount Diablo fairy lantern, if extant, must be acquired. Under the MUDA, land acquisition will be scaled according to the level of impacts.

Zone 5: Under the IUDA at least 5,300 acres of annual grassland and 750 acres of alkali grassland in Subzones 5 a, 5c, and 5d will be preserved and will focus on bringing total protection of alkali grassland and alkali wetlands in the action area to at least 65%. To maximum acquisition of the largest blocks of land the primary focus will be on Subzone 5a. A second priority is to acquire land in Subzone 5d to improve linkages between Vasco Caves Regional Preserve and surrounding open space to benefit San Joaquin kit fox. Zone 5 acquisitions will also preserve suitable habitat for recurved larkspur, San Joaquin spearscale, and brittlescale. Further, land acquisition objectives must include protecting two of the four known occurrences of brittlescale in Subzone 5 and 5d, two occurrences of recurved larkspur in Subzones 5a or 5d, and acquire sites with suitable habitat for vernal pool invertebrates and protect habitat within the Altamont Hills core area recovery region as described by the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Future development at the Byron Airport may be mitigated on site rather than the County paying the fees because of the habitat values on the lands owned by the Byron Airport. Preserved lands would contain alkali grassland, alkali wetland and grassland that are adjacent to the existing preserve and mitigation bank that were established when the airport was built. On site preservation would be 113 acres, and an additional 170 acres preserved off-site in Subzone 5a or 5d. Should the County choose to preserve land off-site they must dedicate a conservation easement on the areas proposed for permanent preservation on a incremental basis for impacting the last 22 of 88 acres that remained covered by the 1992 biological opinion issued by the Service (Service file no. 1-1-92-F-8) and the 1993 Section 2081 permit issued by the DFG. For every acre of impact above this threshold, 2.4 acres will be preserved up to a maximum preservation requirement of 283 acres with full buildout of the airport. Byron Airport may elect to avoid and permanently preserve14 acres of the area proposed for impact on the north edge of the east-west runway. If the 14 acres are preserved in its entirety, the requirements for off-airport conservation may be reduced by 42 acres. If the MUDA is reached, 8,100 acres (79%) of the annual grassland in Subzones 5a, 5b, 5c, and 5d; at least 900 acres (80%) of the alkali grassland; and 40 acres (90%) of the alkali wetlands will have been acquired as well as important habitat connections between already protected lands and the HCP/NCCP preserve lands. Further, all four known occurrences of brittlescale in Subzones 5a and 5d will be preserved. Seasonal and alkali wetlands along the Contra Costa-Alameda County line south of the California Aqueduct will be acquired. Priority in acquisitions will include those sites with suitable habitat for vernal pool invertebrates in areas designated as recovery units. Where feasible, land will be acquired in Subzones 5a and 5c that are modeled for silvery legless lizard.

Zone 6: Located in Subzone 6a, Dutch Slough is a 1,166-acre site in Northeastern Oakley that was recently acquired by the California Coastal Conservancy and the California Department

of Water Resources with the goal of restoring the site to a self-sustaining mixture of shallow water, intertidal marsh, floodplain, riparian, and upland habitats for a numerous species. There are opportunities adjacent to Dutch Slough to support and augment restoration efforts by acquiring cropland and pasture lands for restoration. In Subzones 6b, 6c, or 6f, riparian restoration opportunities occur along Kellogg Creek. In Subzones 6a and 6c and within the ULL there are again numerous restoration opportunities. Parcels may be acquired as long as those parcels are within 1 mile of the Zone 6 boundary. Acquisition in Zone 6 is limited to 250 acres as it is expected that finding willing sellers of agricultural lands will be extremely limited because in order to meet the biological goals for agricultural properties, certain agricultural crops such as orchards and vineyards will be prohibited. However, approximately 18,782 acres of agricultural lands are protected under strong zoning ordinances. If the preservation of cropland or pasture cannot be achieved in Zone 6, grassland habitat that benefits Swainson's hawk in Subzones 5a and 5c may be substituted. Preservation of cropland or pasture in Zone 6 can be substituted for preservation of riparian woodland/scrub at a 5:1 ratio. Cropland or pasture preservation in Zone 6 can be substituted for riparian restoration at a ration of 10:1. At least 100 acres (21%) of the alkali grassland in Zone 6 will be preserved to protect alkaline plants and alkali sink scrub as well as at least 20 acres of alkali wetland

Following are the land-acquisition requirements by land-cover type:

Annual Grassland—13,000–16,500 acres

Alkali Grassland—900–1,250 acres

Oak Savanna—500 acres

Oak Woodland—400 acres

- Chaparral/Scrub—550 acres

Cropland/Pasture—250–400 acres

The total amount of land acquired is expected to be between 23,800 to 30,300 acres. These estimates are significantly greater than the sum of the acquisition requirements stated above because parcel boundaries will not correspond precisely to the requirement for each land-cover type, and more land will need to be purchased to fulfill the acquisition requirements. Also, additional land will be needed to create habitat linkages and preserve covered plant populations. Tables 5-7 and 5-8 in Chapter 5 of the HCP/NCCP provide information of the land acquisition requirements for terrestrial land-cover types.

In addition to the acquisition of wetlands, ponds, streams, and riparian areas through the land-preservation described above, aquatic land-cover types will be preserved in-kind according to the ratios described in Tables 5-5a and 5-5b in Chapter 5 of the HCP/NCCP.

Adaptive Management

The HCP/NCCP contains an adaptive management and monitoring program as required by the five-point policy guidance (65 CFR 106). Adaptive management allows the conservation strategy of the HCP/NCCP to be adjusted throughout the permit term, ensuring that the most up-to-date information is utilized and that the biological goals and objectives are achieved. The strategy will define the feedback process and incorporate feedback loops that link implementation and monitoring to decision-making. Incorporating new monitoring information will effect changes in management to achieve the biological goals and objectives.

The organizational structure of the monitoring and adaptive management decision-making process is described in detail in Chapter 8 of the HCP/NCCP and depicted in Figure 8-1. In general, the IE oversees the adaptive management and monitoring program. Science Advisors, Resources Agencies, and an Independent Assessment Team will provide input and help guide the program, but the IE has ultimate responsibility for implementing the program and instituting changes through adaptive management. Additional responsibilities include prioritizing actions of HCP/NCCP components, disseminating information, developing annual and long-term work plans, and facilitating input from the public and outside scientists. The Executive Director of the IE will work with senior scientists and managers in the IE to implement the adaptive management and monitoring program. Preserve managers, who will be in charge of day-to-day activities within the Preserves, will contribute to annual work plans, and formulate adaptive management recommendations for the Plan as a whole.

A pool of Science Advisors will provide outside input regarding implementation of the monitoring and adaptive management program. Input will be provided regularly as needed to help guide monitoring protocols and experimental design, to interpret results and generate hypotheses, and to comment on the overall success of the monitoring and adaptive management program in achieving the biological goals of the plan. Upon implementation, the Science Advisors will meet formally at least once a year to review the progress of the HCP/NCCP. Formal reviews will occur less frequently as the HCP/NCCP progresses.

The Service and DFG will provide feedback on the implementation of the adaptive management and monitoring program described in the annual work plans. Individuals within the Resource Agencies with particular expertise in management may also participate as Science Advisors. All forms of input will be collected by the IE and incorporated into management and monitoring practices, as appropriate (see Chapter 8, *Implementation*, for more details).

An Independent Conservation Assessment Team, distinct from the Science Advisors, will provide conservation "audits" every five years. The role of the Independent Conservation Assessment Team is described in detail in Chapter 8, *Implementation*.

A Local Land Managers Forum made up of both private and public landholders (e.g., park managers, local landowners) may be established to solicit feedback regarding the effects of

preserve management on adjacent lands, to make recommendations for changing specific aspects of the HCP/NCCP, and to facilitate communication between local landowners and the IE.

Monitoring

Two separate types of monitoring will be required under the HCP/NCCP. First, compliance monitoring documents the Permittee activities and ensures that the IE and the HCP/NCCP Permittees complete obligations as specified within the Plan. Second, a Monitoring Plan measures the biological success of the conservation strategy.

Compliance Monitoring

Compliance monitoring is relatively straightforward and will be tracked by the IE using a database that records land acquisitions and implementation of the conditions on development (planning surveys, impact avoidance through project design, pre-construction surveys, and construction monitoring).

Biological Monitoring

The monitoring program described in Chapter 7 focuses on effectiveness monitoring for the conservation strategy (as opposed to compliance monitoring). The monitoring program will evaluate if the HCP/NCCP is achieving its biological goals and objectives. The IE will be responsible for completing the monitoring and will publish the results in its annual report.

In order to measure the effectiveness of meeting the biological goals and objectives, the Biological Effectiveness Monitoring Plan will address three primary areas:

- effects of the conservation strategy, including management, on landscape, communities, and species;
- ecosystem function; and

  status of Covered Species.

The monitoring program includes specific objectives for landscape-, natural community- and species-level monitoring. In addition, the program is segregated into three major phases: monitoring design (Section 7.3.1 of the Plan), inventory (Section 7.3.2 of the Plan and long-term monitoring (Section 7.3.3 of the Plan). The monitoring priorities within each phase are described in the HCP/NCCP.

Specific monitoring components are recommended for each natural-community type in accordance with these phases and with the scale of the monitoring (landscape, natural community, and species). These recommendations provide a specific starting point for implementation of the monitoring program (see Section 7.5). However, the actual monitoring

program will be developed during implementation of the HCP/NCCP and specifications will be refined at that time. The IE will revise the Monitoring Program whenever review indicates revision is necessary to monitor success effectively in achieving the biological goals and objectives.

Unforeseen Circumstances/No Surprises

"Unforeseen circumstances" are defined as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the Plan's negotiation and development, and that result in a substantial and adverse change in the status of the Covered Species (50 FR 17.3).

The "No Surprises" Rule states, in part, that if unforeseen circumstances arise after the ITP is issued, the Service will not require the commitment of additional land, water or financial compensation or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the Permittee (63 FR 8859).

The assurances contained in "No Surprises" apply only "where the conservation plan is being properly implemented, and apply only with respect to species adequately covered by the conservation plan." For purposes of the "No Surprises" assurances, the term "operating conservation program" shall mean the specific conservation, mitigation, and management measures provided under the HCP/NCCP to minimize and mitigate the impacts of incidental take of the Covered Species.

Another category of circumstances under the federal "No Surprises" rule is "changed circumstances." This term is defined under the rule as "changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the Service and that can be planned for (e.g., the listing of a new species, or a fire or other natural catastrophic event in areas prone to such events)" (50 FR 17.3). The following changed circumstances are recognized and funded by this Plan, each of which is described in Chapter 10.

Covered Species Listed.

- New Non-Covered Species Listed.

Natural Communities Lost to Fire.

Invasion by New Exotic Species or Diseases.

Pond or Wetland Control Structures Fail.

- Flooding Destroys Riparian Plantings.
- Prolonged Drought.

Vandalism of Preserves.

Enforcement, Amendments, and HCP Requirements

The Service may suspend the ITP of the Permittee if that Permittee fails to implement the HCP/NCCP in accordance with the terms and conditions of the ITP and as provided for under applicable regulations. Suspension or revocation of a Section 10(a)(1)(B) permit, in whole or in part, by the Service shall be in accordance with 50 CFR 13.27--29 and the HCP/NCCP IA.

There are three types of changes that may be made to the HCP/NCCP and/or the Permit and/or its associated documents: (1) administrative changes, (2) minor modifications, and (3) major amendments. Any changes, modifications or amendments shall be in accordance with all applicable legal requirements, including but not limited to the Act, the National Environmental Policy Act (NEPA), the California Endangered Species Act (CESA), the California Environmental Quality Act (CEQA), and any other applicable state and federal laws and regulations. The IE shall process all modifications or amendments to the HCP/NCCP, circulating proposed changes to all parties and, if appropriate, approving the amendment or revision by action of the HCP/NCCP IE.

Administrative changes to the HCP/NCCP are internal changes or corrections to the Plan that do not require preauthorization from the Service or DFG. Administrative changes will be made in writing and documented by the IE. The Service and DFG will be provided a summary of administrative changes in an annual report (see Section 10.3.1).

Minor modifications to the HCP/NCCP are changes that do not affect the impact assessment or conservation strategy described in the Plan and do not affect the ability of the IE to achieve the biological goals and objectives of the HCP/NCCP. Minor modifications do not require an amendment to the permit or the Implementing Agreement, but they do require pre-approval by the Service and DFG before being implemented. Minor modifications to the HCP/NCCP may include, but are not limited to: (1) Updates to the land-cover map; (2) Minor changes to the biological goals or objectives in response to adaptive management; (3) Modification of existing or adoption of additional conservation measures that improve the likelihood of achieving HCP/NCCP species objectives; (4) discontinuing implementation of conservation measures if they are ineffective; (5) modification of existing or adoption of new performance indicators; (6) modification of existing or adoption of additional Covered Species or natural community objectives; (7) minor changes to the reporting protocol; and (8) modification of monitoring protocols for Plan effectiveness not in response to changes in standardized monitoring protocols from the Service or DFG.

Changes in the land acquisition configuration of the Plan (see Conservation Measure 1.1, Chapter 5 of the HCP/NCCP) may be necessary to address changing land-use patterns in the action area or a lack of willing sellers in key areas. Changes in land-acquisition requirements that amount to less than 5% of the original acreage requirement are considered minor modifications as long as (1) the overall target-acquisition acreage of land-cover type or habitat for Covered Species does not change within the action area; (2) the changes between zone or subzone (units of analysis in the HCP/NCCP) are biologically equivalent; and (3) the changes do

not significantly affect the ability of the IE to mitigate the impacts on Covered Species, contribute to the recovery of Covered Species, and meet the Plan's biological goals and objectives.

A change in the HCP/NCCP permit area (either a decrease or an increase) in response to an approved change in the ULL is also considered a minor modification, as long as the change in the ULL (1) is compatible with the conservation goals and preserve system configuration of the Plan; (2) is consistent with the urban development areas covered by the Plan and defined in Chapter 2; (3) is consistent with the impact analysis of the Plan; and (4) addresses activities that are already covered by the Plan. Minor modifications are described in Section 10.3.2 of the Plan.

Major amendments to the HCP/NCCP will require amendment of the ITP and/or the Section 2081(b) Permits, and may require amendment of the Implementation Agreement. Amendments may include any of the following types of changes to the HCP/NCCP:

- Revisions of the permit area boundary that do not qualify for a minor modification.

  Addition of species to the Covered Species list.

- Increasing the allowable take limit of existing covered activities or adding new covered activities to the Plan.

  Modifications of any important action or component of the conservation strategy under the HCP/NCCP, including funding, that may substantially affect levels of authorized take, effects of the covered activities, or the nature or scope of the conservation program.

- A major change in performance standards if monitoring or research indicates that performance standards are not attainable because technologies to attain them are either unavailable or infeasible.

- Extending the permit term beyond 30 years.

To amend the ITP, the HCP/NCCP Governing Board will submit a formal application to the Service. This application must include a revised HCP/NCCP, a permit application form, any required fees, a revised IA, and the required compliance document under NEPA. The appropriate NEPA compliance process and document will depend on the nature of the amendment being proposed. Upon submission of a completed application package, the Service will publish a notice of the proposed application in the Federal Register, initiating the NEPA and HCP review process. After public comment, the Service may approve or deny the permit amendment application.

PLAN AREA ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress.

For our analysis, the action area is generally defined as the Plan Area (referred to as the inventory area in the HCP/NCCP) in that we anticipate the direct and indirect affects to Covered Species will be confined to the Plan Area. However, because the local range of the San Joaquin kit fox extends into Alameda County to the south and west, our analyses for this species extends beyond Plan Area. Because of the landscape nature of the proposed action, we are providing a general assessment of the existing condition of the Plan Area. The baseline for individual species is provided in the Status of the Species and Environmental Baseline section of this biological opinion.

The Plan Area encompasses 175,804 acres. It is characterized by rural, urban and suburban development intermixed with agricultural operations and areas of undeveloped lands of which approximately 105,879 acres support natural vegetation... Natural lands are primarily found to the south, west, and northwest of developed areas. Urban development is primarily to the east and north of the Plan Area. The topography in the Plan Area includes the highlands of the Coast Ranges, intermountain valleys and the Sacramento-San Joaquin Delta. Elevations range from Delta islands that are at or below seal level to the 3,849 peak of Mount Diablo, the highest point in the action area. The Plan Area is interspersed with several faults that including the San Pablo Fault and Hayward Fault. The dominant geologic features include the Franciscan Complex and the Great Valley Sequence. These features are characterized by tilting and uplifting, but the Franciscan Complex has also been deformed under pressure from faulting. These forces have resulted in extremely diverse soils, hydrology, and topography.

The Plan Area is divided into categories of land use or vegetation communities including: grassland, chaparral scrub; oak savannah, oak woodland; mixed evergreen forest; riparian woodland/scrub; permanent wetland; seasonal wetland; alkali wetland; stream; aquatic (reservoir); pond, slough/channel; rock outcrop; irrigated agriculture; pasture; cropland; orchard; vineyard; aqueduct; nonnative woodland; turf; wind turbine; and landfill. (See Table 3-3 of the HCP/NCCP for land-cover types and acreages).

Developed land and agricultural lands do not provide the same habitat values as natural lands; however, they do provide some habitat value for covered species. Urban areas with large trees that are adjacent to agricultural lands may provide nesting sites for Swainson's hawks. Agricultural areas can also provide limited support for certain species. Swainson's hawk, tri-colored black birds, and burrowing owls are known to forage in irrigated agricultural areas, particularly crops such as alfalfa fields and pasture. Agricultural lands can provide buffers between developed and natural areas.

Grassland

Grassland is the predominant natural vegetation community in the Plan Area and is found throughout the Plan Area. Annual grassland comprises approximately 59,000 acres (34%) in the Plan Area. Native grasslands are rare in the Plan Area and because patch sizes are so small as to be identified on aerial maps, grasslands were included under annual grasslands. However, there

are known stands of native grassland the largest of which includes 284 acres in the Los Vaqueros watershed. Alkali grasslands are also rare in the Plan Area. Found primarily in the southwest corner between Byron and the Contra Costa-Alameda County line, south of Discovery Bay and immediately west and south of Clifton Court Forebay. While they are a small component of the total acreage within the Plan Area, native and alkali grasslands contain structural and biotic elements that are lacking in annual grassland and, therefore, are important to grassland associated species. In addition, many of the covered plants are only found in alkali grasslands.

Shrubland

Chaparral and scrub is uncommon in the action area, occurring on 3,016 acres (2%). It is found in scattered large and small patches in the higher elevations of the western and southwestern portion near Mount Diablo.

Woodland

Oak savannah, oak woodland, and mixed evergreen forest comprise approximately 30,000 acres of the action area. Oak savannah (5,894 acres) was defined as grassland with a tree canopy cover of 5-10%, and the trees are primarily blue oak (*Q. douglasii), valley oak (Q. lobata*) and interior live oak (*Q. wislizeni*). Oak woodland (24,198 acres) is defined as grassland with a tree canopy cover of more than 10%, however, the majority of oak woodland in the action area is characterized by a canopy cover of nearly 100% with small areas of annual grassland and small chaparral stands. Mixed evergreen forest is dominated by evergreen tress such as California bay, madrone (*Arbutus menziesii*), tanoak (*Lithocarpus densiflora*), and foothill pine.

Riparian

Riparian woodland/scrub (448 acres) is dominated by phreatophytic woody vegetation associated with streams and permanent water sources. Riparian woodland is dominated by trees and contains an understory of shrubs and forbs. Riparian scrub is dominated by young trees and shrubs, typically representing an early successional stage of riparian woodland. Trees when present include Fremont cottonwood (*Populus fremontii*), western sycamore (*Plantus racemosa*), and red willow (*Salix laevigata*). Riparian areas in the permit area occupy narrow corridors in the action area, with a canopy only several trees or shrubs wide. The largest and longest stands of riparian vegetation occur near Pittsburg along Kirker Creek, and along Marsh Creek above and below the Marsh Creek Reservoir.

Wetland

Wetlands were separated, when possible, into seasonal wetland and alkali wetland subtypes by their apparent duration of inundation and abundance of alkali soils. If the type of wetland could not be determined the wetland was classified as the general wetland type. There are 484 acres of wetlands and wetland complexes in the action area. Vernal pools could not be distinguished on aerial photographs and are included as seasonal wetlands or wetlands. Permanent wetlands (or perennial wetlands) are characterized by a year-round water source. Seasonal wetlands support

ponded or saturated soil conditions during the winter and spring and are dry the remainder of the year until the first substantial rainfall. Vernal pools are a subtype of seasonal wetlands, but could not be mapped with available photographs and are included in the seasonal wetland category. A total of 121 acres of seasonal wetland complexes were mapped and may be underrepresented because of the small size, isolated locations and difficulty in interpreting the photographic signature of individual features. In addition, some wetlands were not mapped because of the 1-acre minimum mapping unit. However, vernal pools are expected to be rare in the area based on field surveys in large portions of the action area. In a comprehensive survey of the Los Vaqueros watershed (19,600 acres) 15 acres of northern claypan vernal pools were field verified (Jones & Stokes 1989), most of which where being used as stock ponds. In Cowell Ranch State Park (4,277 acres), 0.4-acre of northern claypan vernal pools were in six natural and 12 artificial pools (see references in Wagstaff and Associates 1996). Most pools varied in size between 300 and 1,500 square feet, the largest between 5,000 square feet. Small amounts of vernal pools (< 1 acres of wetted surface) are found adjacent to the Byron Airport (Stromberg and Ford 2003).

Alkali wetlands support ponded or saturated soil conditions and occur as perennial or seasonally wet features on alkali soils. Vegetation in alkali wetlands are composed of halophytic plant species adapted to both wetland conditions and high salinity levels. Alkali wetlands are rare in the action area and occur in wetland complexes on 380 acres primarily in the southeastern portion of the action area south and east of Byron.

Aquatic

Aquatic land-cover types are open water or aquatic habitats such as lakes, reservoirs, sough, channels, stream, and ponds that do not support emergent vegetation. A total of 3,240 acres (2%) of the aquatic land-cover type occurs in the action area.

Streams include, ephemeral, intermittent and perennial watercourses characterized by a defined bed and bank and/or ordinary high water mark. Perennial streams within the action area are Marsh, Kirker and lower Sand and Deer creeks. Approximately 409 miles of streams are known in the action area based existing data. Assuming streams are 5 feet wide on average this is equivalent to 248 acres of streams. Streams that are channelized and contained by levees are considered slough/channel.

There are four large reservoirs in the action area: Los Vaqueros, Contra Loma, Antioch, and Marsh Creek. They comprise a total of 1,808 acres or 1% of the action area. Ponds are small perennial or seasonal water bodies with little or no vegetation and, if present, it is submerged or floating. Ponds that were identified through mapping were between 0.25-acre and 5 acres in size, and include stock ponds. There are approximately 165 acres of ponds in the action area. As many of these are stock ponds they are distributed fairly evenly over the landscape.

Sloughs and channels are features with perennial water and artificial banks with little or no in-channel vegetation. Banks may be lined with rip-rap, concrete, or rock gabions for bank stabilization. Sloughs are tidally influenced and may contain brackish water. Channels include

urbanized streams. There are approximately 213 acres on the east and southeast sides of the action area near Discovery bay and the Clifton Court Forebay.

Rock Outcrop

Several types of rock outcrops area and are derived from sedimentary, volcanic, and metamorphic sources. Serpentine outcrops could not be mapped with the available data, but are known to occur in the Mount Diablo area (Kruckeberg 1984; California Department of Conservation Division of Mines and Geology1990). Due to mapping limitations, small rock outcrops are likely to occur in chaparral/scrub, grassland, and oak woodland land-cover types. However, 119 acres in 39 patches were identified from aerial mapping.

Irrigated Agriculture

Irrigated agriculture was classified into four subtypes: pasture; cropland; orchard; and vineyard where distinguishable. If not distinguishable, it was considered cropland. Pasture includes fast-growing annual and perennial grasses mixed with irrigated forage crops such as alfalfa. Pastures tend to occur in lowland areas and if primarily found in the eastern portion of the action area between Knightsen and Byron. There is approximately 4,645 acres of pasture found in the action area. Cropland includes orchard, vineyard, pasture and hay production both as dryland and irrigated. Cropland is generally found between Brentwood and the Clifton Court Forebay and occupies 21,221 acres (12%) of the action area. Orchards are found in Oakley and just south of Brentwood. There are 4,187 acres of orchards in the action area. Vineyards occupy 2,141 acres of the action area.

Developed

Developed areas consist of residential, commercial, industrial, transportation, landfill, landscaping, and recreational uses (e.g., horticultural planting, golf courses, and irrigated lawns). This category was subdivided into six subtypes: urban, aqueduct, nonnative woodland, turf, wind turbine, and landfill.

Urban areas include residential, commercial, industrial, transportation, or recreation structures. Rural residential areas were considered urban if they had at least 10 acres of building, turf, and pavement. There are 32,549 acres of urban area mostly in the Cities of Pittsburg, Oakley, Clayton, and Brentwood. Aqueducts are concrete-lined and open perennial flowing water. Major aqueducts in the action area are the Delta-Mendota Canal and the Contra Costa Canal and occupy 383 acres. Nonnative woodlands are ornamental and other introduced species of trees that form a dense canopy. There are 51 acres of nonnative woodland. Turf consists of developed parks and golf courses and occupies 1,477 acres in the action area. The majority of turf is in Contra Loma Regional Park, Brentwood Golf Club, and the Roddy Ranch Golf Course in south Antioch. Wind turbines are found primarily in the southern portion of the action area. The associated roads and turnarounds were mapped. The acreage may be overestimated because the grassland between turbines was included in the acreage calculation. Wind turbines occupy 217 acres in the southern

portion of the action area between Los Vaqueros and Byron Airport. The only active landfill is the Keller Canyon Landfill, located south of Pittsburg, and occupies 334 acres.

STATUS OF THE SPECIES AND ENVIRONMENTAL BASELINE

TOWNSEND'S WESTERN BIG-EARED BAT

A detailed description of Townsend's Western big-eared bat and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

Townsend's big-eared bats occur throughout most of western North America from British Columbia to central Mexico, east to the Black Hills of South Dakota, and across Texas to the Edwards Plateau (Hall 1981; Kunz and Martin 1982). Isolated, relict populations of this species are found in the southern Great Plains and the Ozark and Appalachian Mountains (Hall 1981; Kunz and Martin 1982). The subspecies *townsendii* occurs in Washington, Oregon, California, Nevada, Idaho, and possibly southwestern Montana and northwestern Utah (Handley 1959; Hall 1981). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Townsend's big-eared bats occur in a variety of habitats throughout California, but they are most commonly associated with desert scrub, mixed conifer forest, and pinon-juniper or pine forest habitat. Within these communities, they are specifically associated with limestone caves, mines, lava tubes, and buildings (Dalquest 1947, 1948; Graham 1966; Pearson et al. 1952; Kunz and Martin 1982; Pierson et al. 1991; Dobkin et al. 1995).

Reproductive Ecology

Female Townsend's big-eared bats arrive at maternity roost sites in early spring and give birth to a single offspring in late spring or early summer after an approximately 3-month gestation period (Pearson et al. 1952). In California, young are born over a 3- to 5-week period beginning in late May. Maternity colonies disperse in fall, and mating occurs in fall and winter. Young grow rapidly, reaching adult size in approximately 1 month, and capable of flight in 2.5 to 3 weeks. They are fully weaned by 6 weeks (Pearson et al. 1952).

Dispersal

Townsend's big-eared bat is a relatively sedentary species for which no long-distance migrations have been documented (Pearson et al. 1952; Barbour and Davis 1969; Humphrey and Kunz 1976).

Reasons for Decline and Threats to Survival

Townsend's big-eared bats are highly sensitive to roost disturbance. Activities that can result in significant disturbance or loss of habitat include mine reclamation, renewed mining, water impoundments, recreational caving, loss of building roosts, and bridge replacement (Kunz and Martin 1982; Pierson et al. 1999). Pesticide contamination may also threaten this species in agricultural areas (Geluso et al. 1976).

Status with Respect to Recovery

Townsend's big-eared bat has been classified as a High Priority species by the Western Bat Working Group for all populations throughout its range. This classification indicates that this species is imperiled or is at high risk of imperilment. The global and statewide status of the species is declining.

Environmental Baseline and Status within the Action Area

Townsend's big-eared bat is found throughout California, but specific details on its distribution within the central Coast Ranges are not well known. Records of this species include sites in the coastal lowlands and agricultural areas of Marin, Napa, Alameda, and San Mateo Counties and nearby hills (Pierson 1988). However, there are no published records of Townsend's big-eared bat within Contra Costa County. Because of the scarcity of suitable habitat including mines and caves, it is unlikely that significant maternity roosts of this species occur in the county. However, future research may show that small numbers of individual bats roost in buildings, bridges, or other structures within the action area. The status in the action area is unknown.

SAN JOAQUIN KIT FOX

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (32 FR 4001) and listed by the State of California as a threatened species on June 27, 1971. The *Recovery Plan for Upland Species of the San Joaquin Valley, California* includes this listed canine (Service 1998). A detailed description of San Joaquin kit fox and its distribution, ecology, and threats is in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* and in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The San Joaquin kit fox is found primarily in the Central Valley area of California. Kit foxes currently inhabit portions of the San Joaquin valley and in surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains, from southern Kern County north to Contra Costa; Alameda and San Joaquin counties on the west; and near La Grange, Stanislaus County on the east.

Essential Habitat Components

San Joaquin kit foxes occur in a variety of habitats, including grasslands, scrublands, vernal pool areas, alkali meadows and playas, and an agricultural matrix of row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands (Service 1998). In the northern part of its range (including Contra Costa County) most habitat on the valley floor has been eliminated, and kit foxes now occur primarily in foothill grasslands, valley oak savanna, and alkali grasslands (Swick 1973; Hall 1983; Bell 1994; Service 1998). This shift to more grassland habitat has resulted in kit foxes preying more on California ground squirrels (*Spermophilus beechyii*). Less frequently they occur adjacent to, and forage in, tilled and fallow fields and irrigated row crops (Bell 1994).

Species-Habitat Model

The following land cover types were considered core habitat for the San Joaquin kit fox:

- Annual grassland suitable for all kit fox activities that is connected to known movement routes;
- Oak savanna contiguous with annual grassland;

  Alkali grassland within annual grassland;

  Seasonal wetland within annual grassland or oak savanna;

  Ruderal areas within annual grassland or oak savanna; and

  All wind-turbine areas within annual grassland.

Kit foxes are known to use agricultural areas within the action area in these ways. The following land-cover types were considered low-use habitat for San Joaquin kit fox:

- Cropland, pasture, and orchard land cover types within 1 mile of core habitat as defined above;
- Ruderal areas contiguous with low-use cropland, pasture, or orchard habitat; and
- 100-feet from suitable core habitat into oak woodlands.

Figure 2 in Appendix D in the HCP/NCCP shows modeled habitat for kit fox. There are 64,508 acres of modeled core habitat and 16,694 acres of low-use habitat in the action area.

Reproductive Ecology

Kit foxes can, but do not necessarily, breed their first year. Sometime between February and late March, 2 to 6 pups are born per litter (Zoellick et al. 1987; Cypher et al. 2000). Kit fox density is often positively related to both current and the previous year's prey availability (Cypher et al. 2000). Prey abundance is generally strongly related to the previous year's effective (October to May) precipitation.

Dispersal

Pups emerge above ground at approximately 1 month of age and some disperse after 4 to 5 months, usually between July and September. In a study of 209 dispersing juveniles, Koopman et al. (2000) found that 33% dispersed from their natal territory. The percentage of female dispersal was weakly and inversely related to annual small-mammal prey abundance. Most of the dispersing juveniles (65%) died within 10 days of leaving their natal range. However, survival tended to be higher for dispersing males than for males that remained within their natal area. Kit foxes may range up to 20 miles at night (Girard 2001) during the breeding season and somewhat less (6 miles) during the pup-rearing season. Home ranges vary from less than 1 square mile up to approximately 12 square miles (Knapp 1978; Spiegel and Bradbury 1992; White and Ralls 1993). The home ranges of pairs or family groups of kit foxes generally do not overlap (White and Ralls 1993). This behavior may be an adaptation to periodic drought-induced scarcity in prey abundance.

Reasons for Decline and Threats to Survival

Loss, fragmentation, and degradation of habitat by agricultural, urban, and industrial development continue to decrease the remaining habitat for San Joaquin kit foxes throughout its range. The use of pesticides to control rodents and other pests also threatens kit fox in some areas, either directly through poisoning or indirectly through reduction of prey abundance.

Less than 20 percent of the habitat within the historical range of the kit fox remained when the animal was listed as federally endangered in 1967, and there has been a substantial net loss of habitat since that time. Historically, San Joaquin kit foxes occurred throughout California's Central Valley and adjacent foothills. Extensive land conversions in the Central Valley began as early as the mid-1800s with the Arkansas Reclamation Act. By the 1930's, the range of the kit fox had been reduced to the southern and western parts of the San Joaquin Valley (Grinnell et al. 1937). The primary factor contributing to this restricted distribution was the conversion of native habitat to irrigated cropland, industrial uses (e.g., hydrocarbon extraction), and urbanization (Laughrin 1970; Jensen 1972; Morrell 1972, 1975). Approximately one-half of the natural

communities in the San Joaquin Valley were tilled or developed by 1958 (60 FR 31663).

This rate of loss accelerated following the completion of the Central Valley Project and the State Water Project, which diverted and imported new water supplies for irrigated agriculture (60 FR 31663). Approximately 1.97 million acres (0.79 million hectares) of habitat, or about 66,000 acres (26,709 hectares) per year, were converted to other land uses in the San Joaquin region between 1950 and 1980 (California Department of Forestry and Fire Protection 1988). The counties specifically noted as having the highest wild land conversion rates included Kern, Tulare, Kings, and Fresno, all of which are occupied by the kit fox. From 1959 to 1969 alone, an estimated 34 percent of natural lands were lost within the then-known kit fox range (Laughrin 1970).

By 1979, only approximately 370,000 acres (149,734 hectares) of non-developed land remained in the approximately 8.5 million-acre (3.4 million-hectare) San Joaquin Valley floor (Williams 1985;). Data from the California Department of Fish and Game (1985) and Service file information from between 1977 and 1988 indicates that essential habitat for the blunt-nosed leopard lizard (*Gambelia silus*), a species that occupies habitat that is also suitable for kit foxes, declined from 311,680 acres (126,133 hectares) to 63,060 acres (25,520 hectares). This represented a loss of approximately 80 percent and an average of approximately 22,000 acres (8903 hectares) per year (Biological Opinion for the Interim Water Contract Renewal, Service file 1-1-00-F-0056, February 29, 2000). Virtually all of the documented loss of essential blunt-nosed leopard lizard habitat was the result of conversion to irrigated agriculture.

During 1990 to 1996, a gross total of approximately 71,500 acres (28,935 hectares) of habitat were converted to farmland in 30 counties (total area 23.1 million acres [9.3 million hectares]) within the Conservation Program Focus area of the Central Valley Project. This figure includes 42,520 acres (17,207 hectares) of grazing land and 28,854 acres (11,677 hectares) of "other" land, which is predominantly comprised of native habitat. During this same time period, approximately 101,700 acres (41,157 hectares) were converted to urban land use within the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 49,705 acres (20,115 hectares) of farmland, 20,476 acres (8286 hectares) of grazing land, and 31,366 acres (12,693 hectares) of "other" land, which is predominantly comprised of native habitat. Because these assessments included a substantial portion of the Central Valley and the adjacent foothills, they provide the best scientific and commercial information currently available regarding the patterns and trends of land conversion within the kit fox's geographic range. More than 1 million acres (0.4 million hectares) of suitable habitat for kit foxes have been converted to agricultural, municipal, or industrial uses since the listing of the kit fox. In contrast, less than 500,000 acres (202,343 hectares) have been preserved or are subject to community-level conservation efforts designed, at least in part, to further the conservation of the kit fox (Service 1998).

Extensive habitat destruction and fragmentation have contributed to smaller, more-isolated populations of kit foxes. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (i.e., random)

events such as high variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande 1988; Frankham and Ralls 1998; Saccheri et al. 1998). Similarly, isolated populations are more susceptible to extirpation (localized extinction) by accidental or natural catastrophes because their recolonization has been hampered. These chance events can adversely affect small, isolated populations with devastating results. Extirpation can even occur when the members of a small population are healthy, because whether the population increases or decreases in size is less dependent on the age-specific probabilities of survival and reproduction than on raw chance (sampling probabilities). Owing to the probabilistic nature of extinction, many small populations will eventually go extinct when faced with these stochastic risks (Caughley and Gunn 1995).

Status with Respect to Recovery

The status of San Joaquin kit fox within California is declining. The recovery plan for this species was completed in 1998 that outlines objectives to halt the decline of the species and increase population sizes (Service 1998). Subsequent conservation actions have included acquisition of important habitat by the Bureau of Land Management, DFG, California Energy Commission, Reclamation, Service, and The Nature Conservancy. Substantial long-term research has been conducted on populations in the Naval Petroleum Reserves and in the Carrizo Natural Area in southern California. These studies have provided important information on kit fox habitat requirements, behavior, demographics, and threats.

While kit foxes have been documented in numerous locations in East Contra Costa County, no conservation areas were identified for this species in the 1998 recovery plan. However, the recovery plan identifies the protection of existing kit fox habitat in the northern portion of its range and protection of existing connections between habitat in Contra Costa County and habitat farther south as primary recovery actions.

Environmental Baseline and Status within the Action Area

Fifty-three occurrences of San Joaquin kit foxes have been documented within the action area between 1967 and 1997 (Duke et al. 1997). Fifteen of these records were documented since 1986. The greatest density of occurrences is located in the southern portion of the action area. There were two additional records from May 2001 and June 2002 from Vasco Caves Regional Preserve (Clark et al. 2003). A recent survey of Contra Costa County and Alameda Counties within the known range of the San Joaquin kit fox found no evidence of recent occupancy (Clark et al. 2003). See Appendix D Species Account for San Joaquin Kit Fox for additional detail on this study. Survey results suggest that kit fox density is low or their occurrence is periodic in the action area and the status of the kit fox in the action area is unknown.

Habitat in the northern range is highly fragmented by highways, canals, and development. Interstate 580 runs southeast to northwest as it splits from Interstate 5, and turns west through the Altamont Pass area; thus it impedes both north-south and west-east movement of San Joaquin kit foxes. Although the canal system facilitates north-south migration along its length, it also

impedes lateral east-west kit fox travel. Recent development proposals in Livermore (Alameda County) will further impede the movement of kit fox and isolate the northern population from more southern populations. These and other developments are slowly diminishing the last remaining kit fox habitat, and development pressures are expected to increase in the future. The protection of the remaining travel corridor, including grasslands west of Interstate 580, and lands between the California aqueduct and the Delta Mendota Canal, is vital to the survival of this population.

The Service also issued an incidental permit for projects occurring in San Joaquin County as identified in the San Joaquin Multi-species Open Space and Conservation Plan. Since the issuance of this section 10(a)(1)(B) permit in July of 2001, three projects within the kit fox corridor have been or are in the process of being permitted. These projects will impact approximately 204 acres (83 hectares) of kit fox habitat. The San Joaquin County Council of Governments will purchase lands at a ratio of 3:1 for natural lands and 1:1 for disturbed lands to mitigate for these impacts. In 2002, the McDonald Kit Fox Preserve was acquired in southwest San Joaquin County to compensate for impacts of current and future actions that will affect the kit fox (San Joaquin County 2003).

In 1993, the Service issued a biological opinion (1-1-92-F-48) to Reclamation on the construction and operating effects of the Los Vaqueros Reservoir on kit fox and bald eagle in Contra Costa County. Los Vaqueros Reservoir is located approximately seven miles south of Brentwood in an unincorporated area of the County. The project incorporates approximately 19,000 acres of land. The reservoir inundates approximately 1,460 acres. Approximately 6,500 acres of these lands are managed as specified management lands for listed species. This includes, but is not limited to, modifying grazing and rodenticide practices thereby enhancing grasslands for kit fox. Although management of the entire watershed is primarily to protect water quality, direct and indirect actions to protect water quality will also benefit kit foxes.

The EBRPD owns and manages two large regional preserves within the action area, BDMRP (5,717 acres) and Round Valley (2,024 acres). Kit foxes have been observed periodically within both regional preserves. Round Valley connects directly to Los Vaqueros Reservoir providing an important connection for north/south movement of kit foxes. Both regional preserves are managed for the benefit of natural resources and wildlife, including San Joaquin kit fox. Beneficial management includes limited grazing and pesticide use. Pesticides, if used at all, are used only around park offices and structures.

Adjacent to, and to the south of BDMRP, the Roddy Ranch project converted several hundred acres of grassland to a golf course. In Antioch, Future Urban Area 1 will remove thousands of acres of denning and foraging habitat. In Brentwood, urban development on Balfour Road has encroached into grasslands reducing the amount of available foraging and denning habitat as well as increasing the likelihood of vehicle strikes. Increased visitation to local parklands from people can impact kit foxes, as some of these parks do not have leash requirements in undeveloped

portions of the park.

TRICOLORED BLACKBIRD

A detailed description of tricolored blackbird and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

Tricolored blackbirds are largely endemic to California, and more than 99% of the global population occurs in the state. The species' historical breeding range in California included the Sacramento and San Joaquin valleys, lowlands of the Sierra Nevada south to Kern County, the coast region from Sonoma County to the Mexican border, and sporadically on the Modoc Plateau (Neff 1937). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open accessible water; a protected nesting substrate, including both flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999).

High-quality foraging areas include irrigated pastures, lightly grazed rangelands, dry seasonal pools, mowed alfalfa fields, feedlots, and dairies (Beedy and Hamilton 1999). Lower quality foraging habitats include cultivated row crops, orchards, vineyards, and heavily grazed rangelands.

Species-Habitat Model

Primary foraging habitat is modeled as pasture, grassland, seasonal wetlands, and cropland. Secondary foraging habitat is modeled as orchard and vineyard. Core breeding habitat includes wetland, pond, and sloughs/channels in grassland, alkali grassland, cropland, pastures, ruderal, urban, and oak savanna land-cover types.

Figure 2 in Appendix D shows the modeled habitat of the tricolored blackbird within the action area. The modeled habitat is extensive because it includes a wide range of land-cover types. The total amount of modeled core habitat in the action area is 1,199 acres. The total amount of primary foraging habitat is 87,117 acres and the amount of secondary foraging habitat is 6,335 acres.

Reproductive Ecology

Tricolored blackbirds breed in colonies. One successful nesting effort for a reproductive pair takes about 45 days (Hamilton et al. 1995). Synchronized second broods within a colony may be initiated as little as 30 days after the first brood. The tricolors' synchronized colonial breeding may have been an adaptation resulting from the need to exploit a rapidly changing environment where the locations of secure nesting habitat and rich insect food supplies were ephemeral and likely to change each year (in Beedy and Hamilton 1997). Individual pairs may nest 2 or more times per year.

Dispersal

During the breeding season, tricolored blackbirds exhibit itinerant breeding, commonly moving to different breeding sites each season (Hamilton 1998). Banding studies indicate that significant movement into the Sacramento Valley occurs during the post-breeding period (DeHaven et al. 1975). In winter, numbers of tricolored blackbirds decrease in the Sacramento Valley and increase in the Sacramento–San Joaquin River Delta and north San Joaquin Valley (Neff 1937; Orians 1961; Payne 1969; DeHaven et al. 1975). Concentrations of more than 15,000 wintering tricolored blackbirds may gather at one location and disperse up to 20 miles to forage (Neff 1937; Beedy and Hamilton 1999). Individual birds may leave winter roost sites after less than three weeks and move to other locations (Collier 1968), suggesting winter turnover and mobility. In early March/April, most birds vacate the wintering areas in the Central Valley and along the coast and move to breeding locations in the Sacramento and San Joaquin Valleys (DeHaven et al. 1975).

Reasons for Decline and Threats to Survival

The greatest threats to this species are the direct loss and alteration of habitat. Other human activities and predation also threaten tricolored blackbird populations in the Central Valley (Beedy and Hamilton 1999).

Status with Respect to Recovery

The state status for tricolored blackbird is declining. The Service, DFG, and California Audubon cosponsored intensive, volunteer tricolored blackbird surveys in modeled habitats throughout California in 1994, 1997, 1999, and 2000 (Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000). Local, regional, and statewide tricolored blackbird populations have experienced major declines since 1994, therefore it is likely the population is declining in the action area.

Environmental Baseline and Status within the Action Area

The tricolored blackbird is a sporadic resident within the action area. CNDDB records document 2 breeding colony occurrences along the northern border of the Los Vaqueros watershed. The Contra Costa County Breeding Bird Atlas shows additional breeding locations east and north of these areas (Flying Emu Birding Pages 2006).

GOLDEN EAGLE

A detailed description of golden eagle and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The golden eagle is Holarctic in distribution. In North America, it breeds from northern and western Alaska east to the Northwest Territories, Canada, and south to southern Alaska, Baja California, the highlands of northern Mexico, west-central Texas, western portions of Oklahoma, Nebraska, and the Dakotas, and irregularly in eastern North America. The golden eagle winters in North America from south-central Alaska and the southern portions of the Canadian provinces south throughout the western breeding range and more rarely eastward (Johnsgard 1990). A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

Golden eagles use nearly all terrestrial habitats of the western states except densely forested areas. In the interior central Coast Ranges of California, golden eagles favor open grasslands and oak savanna, with lesser numbers in oak woodland and open shrublands (Hunt et al. 1998). Secluded cliffs with overhanging ledges and large trees are used for nesting and cover.

Species-Habitat Model

In the interior central Coast Ranges of California, golden eagles use nearly all terrestrial habitats except urban, aquatic, turf, orchards, vineyards, and densely forested areas. In Contra Costa County, there are numerous traditional and stable nesting sites and territories of golden eagles. Modeled foraging habitat includes all land-cover areas except urban, aqueduct, aquatic, turf, orchards, and vineyards. Traditional nesting sites were not mapped but were identified by researchers. Nesting habitat typically includes secluded cliffs with overhanging ledges and large trees adjacent to suitable foraging habitat.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the golden eagle within the action area. The documented occurrences of golden eagle include both verified nesting sites

and estimated territory areas. The amount of modeled foraging habitat in the action area is 132,347 acres.

Reproductive Ecology

Nest building can occur almost any time of year (Brown 1976). Golden eagles prefer to locate their nests on cliffs or trees near forest edges or in small stands near open fields (Bruce et al. 1982; Hunt et al. 1995, 1998). Mating occurs from late January through August, with peak activity in March through July. Eggs are laid from early February to mid-May. Clutch size varies from 1 to 4 eggs, but 2 is the most common size (Brown 1976; Johnsgard 1990; Hunt et al. 1995). Incubation lasts 43–45 days (Beebe 1974), and the fledging period is about 72–84 days (Johnsgard 1990). The young usually remain dependent on their parents for as long as 11 weeks afterward.

Dispersal

Breeding golden eagles in the central Coast Ranges of California are mostly resident; juveniles may remain in the vicinity of their natal area until evicted by the parents. Floater non-breeding birds (adults without breeding territories) commonly move about regionally until they find a suitable vacant territory or are able to evict a territorial owner (Brown 1969; Hunt et al. 1995, 1998).

Reasons for Decline and Threats to Survival

Existing threats to golden eagle survival in the central Coast Ranges of California include both foraging- and nesting-habitat loss; human disturbance of nesting birds; and direct fatalities from wind turbine strikes, electrocution, and poisoning.

Status with Respect to Recovery

Within California, golden eagle is declining in southern California and common and presumably stable elsewhere in California. The status of the golden eagle in the United States appears to be stable or unknown elsewhere in the world. Braun *et al.* (1975) estimated the total North American population of golden eagles at "up to 100,000 individuals." Huegly (1975) estimated the population in the western U. S. in excess of 40,000 birds. Olendorff *et al.* (1981) estimated a winter population of 63,000 golden eagles in the western United States, with 5,000 of these in California. Thelander (1974) estimated 500 breeding pairs of golden eagles in California. The golden eagle population is believed to be stable or increasing, although the Breeding Bird Survey trends indicate a decline in the central part of the United States between 1968 to 1989, while populations in the west have fluctuated, with the most recent years (1980 - 1989) showing a decline. California populations increased from 1968 to 1980, but decreased non-significantly

from 19980 to 1989 (United States Department of Agriculture 1994). However, no recent estimates of the golden eagle population are available. Golden eagle management and conservation generally includes habitat management, population enhancement, hazard management (including reducing wind turbine strikes), controlling human activity in sensitive raptor areas, and education.

Environmental Baseline and Status within the Action Area

The golden eagle is a resident breeder and migrant within the action area. The reproductive status of numerous nesting pairs has been monitored regularly within this general area (Hunt et al. 1998). The Contra Costa County Breeding Bird Atlas (Flying Emu Birding Pages 2006) shows additional breeding locations east and north of these areas. The Altamont Wind Pass Area in Alameda and southeastern Contra Costa County supports the highest known density of nesting territories in the world (Golden Gate Audubon Society).

WESTERN BURROWING OWL

A detailed description of the western burrowing owl and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The western burrowing owl is found throughout western North America, west of the Mississippi River and south into Mexico. In California the range of western burrowing owl extends through the lowlands south and west from north central California to Mexico, with small, scattered populations occurring in the Great Basin and the desert regions of the southwestern part of the state (DeSante et al. 1997). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Burrowing owls require habitat with three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles (Klute et al. 2003). During the breeding season, they may also need enough permanent cover within their foraging range to provide them with sufficient prey (Wellicome 1997). Burrowing owls occupy grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots, as well as the margins of airports, golf courses, and roads.

The most important habitat consideration for the burrowing owl is the availability of underground burrows throughout their life cycle. They use burrows excavated by fossorial (i.e.,

digging) mammals or reptiles, including prairie dogs, ground squirrels, badgers, skunks, armadillos, woodchucks, foxes, coyotes, and gopher tortoises (Karalus and Eckert 1987).

Species-Habitat Model

Within the action area breeding and foraging habitat are modeled as annual grassland, alkali grassland, wind turbine, seasonal wetland, ruderal and turf land cover types. In addition, small patches of agriculture are suitable for burrowing owls. To account for the occasional use by burrowing owls of fallow agricultural fields, and the low-density use by owls of patches of ruderal areas, all pasture and cropland habitat was mapped as low use.

Figure 2 shows in Appendix D of the HCP/NCCP shows the modeled habitat of the western burrowing owl within the action area. Modeled habitat smaller than 10 acres outside model boundaries (e.g., patches associated in residential areas and around airports) was not mapped and is therefore potentially under-represented. However, the model conservatively estimates the amount of grassland, ruderal, cropland, and pasture habitat available to burrowing owls for breeding and foraging (69,415 acres of breeding and foraging habitat, and 25,866 acres of low-use habitat).

Reproductive Ecology

Burrowing owls in California typically begin pair formation and courtship in February or early March, when adult males attempt to attract a mate. Like other owls, western burrowing owls breed once per year in an extended reproductive period, during which most adults mate monogamously. Both sexes reach sexual maturity at one year of age. Clutch sizes vary, and the number of eggs laid is proportionate to prey abundance (the more prey that is available, the more eggs owls tend to lay). Clutches in museum collections in the western United States contain 1 to 11 eggs (Murray 1976). The incubation period is 28–30 days. The female performs all the incubation and brooding and is believed to remain continually in the burrow while the male does all the hunting. The young fledge at 44 days but remain near the burrow and join the adults in foraging flights at dusk (Rosenberg et al. 1998).

There is little information on lifetime reproductive success (Haug et al. 1993). Females supplemented with food will have higher reproductive success than females without supplemented food, which may explain poor reproductive success in areas with low-quality foraging habitat (Wellicome 1997). Depending on assumptions about migration, the probability that juvenile burrowing owls will survive to 1 year of age (the age of first breeding) has been estimated between 0.23 and 0.93, and annual adult survivorship between 0.42 and 0.93 (Johnson 1997).

Dispersal

Burrowing owls tend to be resident where food sources are stable and available year-round. They disperse or migrate south in areas where food becomes seasonally scarce. In northern California, burrowing owls migrate south during September and October.

Reasons for Decline and Threats to Survival

An immediate threat to the burrowing owl is the conversion of grassland habitat to urban and agricultural uses, and the loss of suitable agricultural lands to development. Equally important is the loss of fossorial rodents, such as prairie dogs and ground squirrels, across much of the burrowing owl's historical habitat. Another cause of population declines is thought to be pesticide use (especially organophosphates in southern Canada), but evidence does not clearly indicate that other contaminants are reducing populations (Gervais et al. 1997).

Status with Respect to Recovery

In North America, the burrowing owl is experiencing population declines throughout the northern half of the Great Plains and general population increases in the northwest interior and some southwestern deserts (Klute et al. 2003). In Canada, its numbers are rapidly declining, and, in 1995, the Committee on the Status of Endangered Wildlife in Canada listed it as endangered. In Mexico, it is officially considered threatened. Common management efforts employed to conserve existing burrowing owl colonies include prevention of all disturbances during the nesting season, installation of artificial burrows, and management of the vegetation around the burrows by mowing or controlled grazing.

Environmental Baseline and Status within the Action Area

Western burrowing owls occur in the southeast portion of the action area (Glover pers. comm.) and likely occur in potential habitat throughout other portions of the action area. No comprehensive survey for the burrowing owl has been conducted in the action area, so the current population size or the locations of all occurrences are not known. There are very few documented occurrences of western burrowing owl in the action area, but this is surely due to a lack of survey effort and underreporting. A western burrowing owl mitigation bank established adjacent to the Bryon Airport has sold all of its available mitigation credits. Just south of the action area in Alameda County near Bruns Road and Kelso Road there are several conservation areas managed for western burrowing owls by DFG totaling approximately 550 acres.

SWAINSON'S HAWK

The Swainson's hawk is listed by the State of California as a threatened species and is protected under the MBTA. Additional information on the life history of the Swainson's hawk is in DFG's

November 1, 1994, *Staff Report regarding Mitigation for Impacts to Swainson's Hawk (Buteo swainsoni) in the Central Valley of California* (California Department of Fish and Game 1994) and in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The Swainson's hawk breeds in desert, shrubsteppe, grassland, and agricultural habitats in areas throughout most of the western United States and Canada, and in northern Mexico (England et al. 1995). They are locally common to rare breeders in California. Historically, breeding populations probably occurred throughout California, except in bioregions characterized by mountainous forested terrain (Bloom 1980). Breeding populations in California currently occur in 2 locations, the Great Basin and the Central Valley. A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

In general, Swainson's hawks inhabit a wide variety of open habitats. In California's Central Valley, modeled habitat consists of two primary elements: suitable nest trees and proximity to high-quality foraging habitat. This species nests within riparian forest or in remnant riparian trees and forages in agricultural lands (such as fallow fields and alfalfa fields) (Estep 1989; Babcock 1995).

Stringers of remnant riparian forest along drainages contain the majority (87 percent) of known nests in the Central Valley (England *et al.* 1995, Estep 1984, Schlorff and Bloom 1984). Swainson's hawks usually nest in large (12.2-18.3 m, 40-60 ft.) native trees such as valley oak (*Quercus lobata*), cottonwood (*Populus fremontii*), walnut (*Juglans* sp.), and large willow (*Salix* sp.) and generally do not utilize non-native trees (Estep and Teresa 1992). Nest sites are always directly associated with high-quality foraging habitat (Estep 1989). The loss of foraging habitat is recognized as having the potential to cause the abandonment of breeding territories and to contribute to a continued reduction in the statewide breeding population (California Department of Fish and Game 1988).

The hawk's minimum foraging area depends upon the vegetation supporting the prey populations and the farming activities that make prey particularly susceptible to predation, such as reduction of cover after harvesting, discing, mowing, flood irrigation and burning. The hawk's highly active foraging behavior often results in birds traveling as far as 30 km from a nesting site (Estep 1989). Hawk foraging ranges fluctuate annually in response to changing crop patterns, and seasonally in response to changes in prey accessibility and abundance (Estep and Teresa 1992). Communal foraging occurs, especially when agricultural fields such as alfalfa undergo some form of cutting or harvesting (Babcock 1995). Swainson's hawks have been observed foraging behind farm machinery (moving harvester blade or disc), capturing rodents that have become exposed from ground disturbance (Estep, 1989). Overall, estimates of foraging range size can vary from 1,532 to 6,746 acres (6.2 to 27.3 km^2) (Schmutz 1977, Andersen 1995). Suitable cover

types for foraging habitats, in order of suitability, include native grassland, agriculture soon after discing, alfalfa and other hay crops, fallow fields, lightly grazed pasture, combinations of hay, grain, and row crops, rice fields prior to flooding and after draining, and heavily grazed pasture. Unsuitable cover types for foraging habitats include vineyards, mature orchards, flooded rice fields, cotton, thistle in fallow fields and any crop where prey are unavailable due to high vegetation height and density (Estep 1989).

Species-Habitat Model

There are no breeding records of Swainson's hawk west of Marsh Creek despite the occurrence of high-quality riparian habitat (e.g., Kirker Creek). The western extent of the breeding range of this species was considered to be Marsh Creek (Estep pers. comm.; Sterling pers. comm.) Breeding habitat was modeled as riparian woodland scrub and non-native woodland land cover types within the action area in or east of Marsh Creek and below 200 feet in elevation.

All cropland and pasture, within 10 miles of existing breeding sites or potential breeding habitat were considered potential Swainson's hawk foraging habitat. Annual grassland, alkali grassland, and seasonal wetland land-cover types below 200 feet in elevation are also considered potential foraging habitat.

Figure 2 in Appendix D of the HCP/NCCP shows modeled habitat of the Swainson's hawk within the action area. Modeled breeding habitat is restricted to riparian areas along lower Marsh Creek (above and below the Marsh Creek Reservoir) and isolated stands of non-native woodland. Modeled foraging habitat includes extensive areas of row-crop and pasture land cover within the action area. There are 82 acres of modeled breeding habitat in the action area and 31,231 acres of foraging habitat.

Reproductive Ecology

Density of Swainson's hawks within their breeding territories is influenced by land use and availability of nest trees (Estep 1989). Nest trees may be isolated or in a riparian forest (England et al. 1997). In general, Central Valley Swainson's hawks will have a single clutch, which will be completed by mid-April (Estep 1989). The female does the majority of incubating, and the incubation period lasts 34–35 days (Fitzner 1980). Young fledge at approximately 38–46 days (England et al. 1997).

Swainson's hawks show a high degree of nest fidelity and generally return to the same area in which they nested previously. They will investigate several nest sites within this "territory," and settle on one nest dependent on local disturbances, surrounding habitat variables, the proximity of other nesting raptors (i.e., great horned owls, redtail hawks, etc.), and nest condition, although this selection mechanism is not well understood. Some pairs may repair several nests before settling in on one nest site. In the case of juvenile birds, they may build and/or repair a nest and

then leave without laying eggs. Therefore, in any given year, and any given area, depending on nest site availability, many of the available nest sites may not be used.

Dispersal

Swainson's hawks arrive on the breeding grounds in late February and early March in the Central Valley and in mid-April in the Great Basin. In September, most Swainson's hawks migrate to the Pampas of southern South America. However, the Central Valley population winters in Central Mexico and to a lesser extent throughout Central and South America (Bradbury et al. in prep.).

Reasons for Decline and Threats to Survival

Loss of high-quality nesting habitat is probably the most significant threat to the species' population within the action area. Loss of nesting habitat (remnant riparian) may be a threat to this species statewide. In addition, nest sites on private lands are vulnerable to changes in development and agricultural practices. Loss of foraging habitat to urban development is also a significant threat. The loss of agricultural lands due to urban development is further removing essential Swainson's hawk foraging habitat throughout the mid-section of the Central Valley (Estep and Teresa 1992). Swainson's hawks are sensitive to habitat fragmentation and will avoid low-density development even though suitable prey conditions may exist (Estep and Teresa 1992). They have not been found in apparently suitable urban areas in the Central Valley where foraging habitat is unavailable for 5-8 km (e.g., Lodi and Sacramento), thus requiring long-distance transport of prey throughout the entire nesting cycle. Rapid urbanization or crop changes near cities could cause the long-term decline of Swainson's hawks in existing urban neighborhoods (England *et al.* 1995). Additional threats are habitat loss due to riverbank protection projects, conversion from agricultural crops that provide abundant foraging opportunities to crops such as vineyards and orchards, shooting, pesticide poisoning of prey animals and hawks on wintering grounds, competition from other raptors, and human disturbance at nest sites.

Status with Respect to Recovery

The global and statewide status of the Swainson's hawk is declining. Status within the action area is unknown. Historically, as many as 17,000 Swainson's hawk pairs may have nested in California (California Department of Fish and Game 1992b, 1994). Currently, there are 882 known extant nesting site occurrences in California (Estep 2001, in City of Sacramento *et al.* 2003). The action area is in the Central Valley population of hawks, which consists of an estimated 600 to 900 of the remaining breeding pairs. The overall Swainson's hawk population is considered to be declining (California Department of Fish and Game 1992b, 1994). However, the Central Valley's breeding population has remained stable over the past ten years (Estep 2001, in City of Sacramento *et al.* 2003).

Environmental Baseline and Status within the Action Area

Swainson's hawks have been documented nesting in the action area; however, they are not regular breeders there. The core breeding population occurs along the Central Valley floor, outside of the action area. In the action area, most pairs have been observed nesting in small clumps of eucalyptus trees (Glover pers. comm. 2002). There are four CNDDB (2001) records of Swainson's hawk nesting in the northeast section of the action area.

SILVERY LEGLESS LIZARD

A detailed description of silvery legless lizard and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The silvery legless lizard is nearly endemic to California. It ranges from Antioch in Contra Costa County south through the Coast, Transverse, and Peninsular Ranges, along the western edge of the Sierra Nevada Mountains and parts of the San Joaquin Valley and Mojave Desert to El Consuelo in Baja California (Hunt 1983; Jennings and Hayes 1994). Its elevation range extends from near sea level on the Monterey Peninsula to approximately 1,800 meters above sea level in the Sierra Nevada foothills. A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Silvery legless lizards occur primarily in areas with sandy or loose loamy soils such as under sparse vegetation of beaches, chaparral, or pine-oak woodland; or near sycamores, cottonwoods, or oaks that grow on stream terraces (Gorman 1957; Cunningham 1959; Banta and Morafka 1968; Stebbins 1985; Jennings and Hayes 1994). The sandy loam soils of stabilized dunes seem to be especially favorable habitat (Grinnel and Camp 1917; Miller 1944; Smith 1946; Bury 1985). The species is often found under or in the close vicinity of logs, rocks, old boards, and the compacted debris of woodrat nests (Jennings and Hayes 1994).

Species-Habitat Model

Suitable modeled habitat includes sand to sandy loam soil areas[4] (Soil Conservation Service 1977) in chaparral/scrub, oak woodland, ruderal, and riparian woodland/scrub land-cover types. Figure 2 in Appendix D shows the modeled habitat of the silvery legless lizard within the action area. The habitat is largely defined by the presence of suitable soils within chaparral/scrub, oak

[4] Any soil type that mentioned "sand" or "sand and loam" was considered a sandy loam soil potentially suitable for silvery legless lizard.

woodland, riparian woodland land-cover areas. The only documented occurrence of this species in the action area is at the East Bay Regional Park District Legless Lizard Preserve east of the intersection of Highway 4 and Big Break Road in Oakley. There are 3,422 acres of modeled habitat in the action area.

Reproductive Ecology

Silvery legless lizards are live-bearing and are believed to breed between early spring and July (Goldberg and Miller 1985). Litters of 1 to 4 (normally 2) young are born from September to November (Miller 1944).

Reasons for Decline and Threats to Survival

Legless lizards cannot survive in urbanized, agricultural, or other areas where a loose substrate in which to burrow has been removed or altered (e.g., disturbed by blowing or bulldozing) (Jennings and Hayes 1994). Other factors that threaten the lizard include livestock grazing, off-road vehicles activities, sand mining, beach erosion, excessive recreational use of coastal dunes, and the introduction of exotic plant species. Pesticides may also threaten legless lizards because of the species' insectivorous diet (Honegger 1975). Increasing numbers of feral cats associated with residential areas also threaten extant populations of this species (Miller 1944; Jennings and Hayes 1994).

Status with Respect to Recovery

The statewide status of the lizard is declining. Except for the documented occurrence at the EBRPD's Legless Lizard Preserve, its status within the action area is unknown.

Environmental Baseline and Status within the Action Area

The East Bay Regional Park District Legless Lizard Preserve is located east of the intersection of Highway 4 and Big Break Road north of Oakley. This is the only one CNDDB record for this species in the action area, but other occurrences are likely to exist within the action area due to the presence of suitable habitat.

ALAMEDA WHIPSNAKE

The Alameda whipsnake was federally listed as threatened on December 5, 1997, (62 FR 234) and listed by the State of California as a threatened species in 1971. Approximately 406,598 acres (164,545 hectares) of critical habitat was designated for the Alameda whipsnake within Contra Costa, Alameda, Santa Clara, and San Joaquin counties on October 3, 2000 (62 FR 58933-58962). The critical habitat designation was vacated and remanded on May 9, 2003.

Critical habitat was proposed again for the Alameda whipsnake on October 18, 2005, (71 FR 26311). Critical habitat was designated on October 2, 2006 (71 RF 58175). The Service conducted the 4(b)(2) analysis as required under the Act when we weighed the benefits of designation of critical habitat to the benefits of excluding critical habitat within the boundaries of the HCP. The Secretary concluded that the Plan provided more benefits than the designation and excluded the Plan boundaries from critical habitat. A draft Alameda whipsnake recovery plan was included in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California*, issued in November 2002 (Service 2002a)

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A detailed description of Alameda whipsnake and its distribution, ecology, and threats is described in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* and Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movement

The Alameda whip snake's range is restricted to the inner Coast Range in western and central Contra Costa and Alameda Counties (62 FR 58933). A range map of the species is in Appendix D of the HCP/NCCP.

Essential Habitat Components

The Alameda whipsnake occurs primarily in coastal scrub and chaparral communities, but also forages in a variety of other communities in the inner Coast Range, including grasslands and open woodlands (Swaim 1994). Habitat necessary to sustain the essential life history functions of the subspecies include: (1) scrub/shrub communities with a mosaic of open and closed canopy; (2) woodland or annual grassland plant communities contiguous to lands containing the habitat components found in 1; and (3) lands containing rock outcrops, talus, and small mammal burrows. (62 FR 58933-58962).

Scrub and chaparral communities are the primary habitat types essential for providing space, food, and cover necessary to sustain all life stages of the Alameda whipsnake. Associated scrub habitat typically consists of Diablo sage scrub, coyote bush scrub, and chemise chaparral (Swaim 1994), and is classified as coastal scrub, mixed chaparral, and chemise-redshank chaparral (California Department of Fish and Game 1988). Swaim (1994) found that core scrub habitat areas (areas of concentrated use by Alameda whipsnakes, based on telemetry and trapping data) tended to occur on east, southeast, south or southwest facing slopes and were within 500 feet (152.4 meters) of open or partially-open canopy or grassland habitat. Subsequent to that study, Alameda whipsnakes have been found in open chaparral stands with a northern exposure (K. Swaim, Swaim Biological Consulting, personal communication with the Service 2004). In addition, incidental observations and trapping surveys have documented Alameda whipsnakes more than 600 feet (182.9 meters) and as far as 21,600 feet (6.6 kilometers) from primary scrub and chaparral habitat (K. Swaim, Swaim Biological Consulting, personal communication with

the Service 2004).

Species-Habitat Model

Direct observations of Alameda whipsnakes and radio telemetry data on their movement patterns have shown that individuals tend to establish home ranges primarily within coastal scrub habitat, but they also frequently move into adjacent grassland, oak savanna, and occasionally oak woodland (Stebbins 1985; Swaim 1994). All chaparral and scrub land cover within the action area was considered core habitat for Alameda whipsnake. In addition, a perimeter zone of all adjacent grassland, oak savanna, and oak woodland within 500 feet of the scrub areas was considered core habitat for this species. All areas of annual grassland, oak woodland, oak savannah, riparian woodland/scrub, and stream channels within a 1-mile radius of core Alameda whipsnake were defined as movement habitat.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the Alameda whipsnake within the HCP/NCCP action area. The habitat includes the eastern slopes of Mt. Diablo and much of the surrounding foothills in the western and southwestern portions of the action area. The documented occurrences of Alameda whipsnakes in this area correspond well to locations within core areas or in adjacent movement habitat and corridors. Two recently documented occurrences are located in grassland habitat north and northeast of Los Vaqueros Reservoir approximately four miles from the nearest potential chaparral/scrub habitat. Aerial photos at these locations were examined and no visible features (e.g., small patch of scrub, small rock outcrop, etc.) that might explain the occurrences were found. A total of 9,332 acres of core and perimeter habitat and 37,928 acres of non-stream movement habitat were modeled in the action area.

Reproductive Ecology

Mating occurs from late March through mid-June (62 FR 58933). According to Swaim (1994), female Alameda whipsnakes will use grassland habitat for egg laying. During the breeding season, male snakes exhibit more movement throughout their home range, while female snakes remain sedentary from March until egg laying (Swaim 1994).

Dispersal

The Alameda whipsnake is non-migratory. There is little information on site fidelity and patterns of dispersal in this species; however, Swaim (1994) observed evidence of individual snakes using the same home range in successive years.

Reasons for Decline and Threats to Survival

Alameda whipsnake populations have declined from loss of habitat resulting from urban expansion (62 FR 58933). Urban development, particularly road and highway construction, has fragmented Alameda whipsnake populations and made them more vulnerable to extinction (62 FR 58933). Urban development adjacent to whipsnake habitat increases the likelihood of predation from feral cats and injury or death from public recreational use. Other significant threats to this species' recovery include inappropriate grazing practices and alteration of habitat through fire suppression (62 FR 234).

Urban development has fragmented the once contiguous range of the Alameda whipsnake into the following five population centers: (1) the Tilden-Briones population (Sobrante Ridge, Tilden/Wildcat Regional Parks to the Briones Hills, in Contra Costa County); (2) the Oakland-Las Trampas population (Oakland Hills, Anthony Chabot area to Las Trampas Ridge, in Contra Costa County); (3) the Hayward-Pleasanton Ridge population (Hayward Hills, Palomares area to Pleasanton Ridge, in Alameda County); (4) the Mount Diablo-Black Hills population (Mount Diablo vicinity and the Black Hills, in Contra Costa County); and (5) the Sunol-Cedar Mountain population, (Wauhab Ridge, Del Valle area to the Cedar Mountain Ridge) (62 FR 234).

Habitat fragmentation appears to have resulted in little to no gene flow or interchange between the five populations. Interchange between the Tilden-Briones, Oakland-Las Trampas, and Hayward-Pleasanton Ridge populations appears to depend on dispersal over the Caldecott Tunnel in Contra Costa County; under State Route 580 in Alameda County (at the Eden Canyon interchange); under the Dublin Boulevard undercrossing; or where San Lorenzo Creek passes under the highway (62 FR 234). Interchange between the Hayward-Pleasanton Ridge and Sunol-Cedar Mountain populations depends on dispersal along Alameda Creek in Alameda County; crossing under I-680 (where the creek passes under the highway); or crossing under the highway at Scott's Corner along Vallecitos Creek, or where two unnamed tributaries to Arroyo de la Laguna cross under I-680 north of Scott's Corner (62 FR 234). The Mount Diablo-Black Hills population appears to be completely isolated from the other populations (62 FR 234).

Habitat fragmentation makes some Alameda whipsnake populations more vulnerable to extinction. Habitat patches with high edge to interior ratios provide less value for some species than round or square patches (Jimerson and Hoover 1991; Saunders *et al.* 1991). In general, the species most prone to extinction in fragmented habitats are those that depend on native vegetation; require combinations of different habitat types; require large territories; and exist at low densities (Saunders *et al.* 1991). Alameda whipsnakes have been associated with a variety of habitats for different natural history functions. They are primarily associated with native Diablan sage scrub, but are known to forage in adjacent grasslands, and migrate along riparian corridors. The combination of these factors may cause the Alameda whipsnake to be more vulnerable to extinction in small habitat patches resulting from habitat fragmentation.

The Alameda whipsnake has a variety of potential native and exotic predators including California kingsnake (*Lampropeltis getula californiae*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginianus*), coyote (*Canis latrans*), gray fox (*Vulpes cinereoargenteus*), red fox (*V. vulpes*), and red-tailed hawk (*Buteo jamaicensis*). Urbanization often facilitates the introduction or spread of non-native predators (Goodrich and Buskirk 1995). Increased predatory pressure may become excessive in situations where Alameda whipsnake habitat is fragmented, isolated, and otherwise degraded by human activities. This may be especially true where non-native species, such as rats, feral pigs (*Sus scrofa*), and feral and domestic cats (*Felis domesticus*) and dogs (*Canis familiaris*) are present. These additional threats become particularly acute where urban development immediately adjacent to Alameda whipsnake habitat. A growing movement to maintain feral cats in parklands, such as those managed by EBRPD, is a potential threat to a variety of wildlife species (Coleman *et al.* in litt. 1997; Roberto 1995; DelVecchio 1997). Little is known about the predation of Alameda whipsnakes, but feral cats are known to prey on reptiles, including the yellow racer (*Coluber mormon*), a fast, diurnal snake similar to the Alameda whipsnake (Hubbs 1951; Stebbins 2003). The threat of predation and harassment from domestic and feral cats and other non-native species increases as human disturbance from recreational use on regional and state parks, and urban development encroaches into the current open space buffers between existing developments and Alameda whipsnake habitat on public lands (Coleman *et al.* in litt. 1997).

The effects of fire suppression directly and indirectly threaten the Alameda whipsnake. Fire suppression results in a buildup of fuel (underbrush, thatch, and woody debris). This exacerbates the effects of wildfires by creating conditions for hot, slow-moving fires. The development of a closed scrub canopy also results in a buildup of flammable fuels over time (Parker 1987; Rundel *et al.* 1987). Fire suppression can also result in the spread and proliferation of non-native vegetation, further increasing flammable fuel loads in and around Alameda whipsnake habitat. The threat of wildfire is typically highest in the summer and early fall when accumulated fuel is abundant and dry. This "fire season" coincides with the primary aboveground activity period for hatchling and adult Alameda whipsnakes (Swaim 1994). Therefore, populations may sustain heavy losses from fires during this period.

Encroaching urban development has lead to the implementation of rigorous fire suppression practices in and around adjacent suitable Alameda whipsnake habitat. Frequent fire events are important in maintaining the scrub habitat associated with the Alameda whipsnake. Many native coastal scrub and chaparral plant species require periodic fires to stimulate new sprouting, seedling recruitment, and seed dispersal (Parker 1987; Keeley 1987; Keeley 1992). The optimal frequency of fire events is often disputed but likely ranges from every 10 to 30 years (Keeley 1987; Rundel *et al.* 1987).

Status with Respect to Recovery

The population status of the Alameda whipsnake within the action area is unknown. The Service published a draft recovery plan for the Alameda whipsnake in November 2002. As stated above,

the Service lists the Mount Diablo–Black Hills population of the Alameda whipsnake as having a high potential for recovery if threats from urban development, catastrophic wildfire, and grazing practices can be managed well (Service 2002a). At least three HCPs that cover the species are in development:

Alameda Watershed HCP (San Francisco Public Utilities Commission);

Bay Area Operations & Maintenance HCP (Pacific Gas & Electric Company)

- East Bay Watershed Lands HCP (East Bay Municipal Utilities District).

According to the recovery plan, recovery of Alameda whipsnake populations will require a combination of long-term research/management and immediate management actions. Incompatible land uses include fire suppression, off-road vehicle use, grazing practices, unauthorized collecting, and mining.

Environmental Baseline and Status within the Action Area

Of the 48 CNDDB (2001) records for the Alameda whipsnake in the state, 19 records occur within the action area. A large portion of the Mount Diablo–Black Hills population of the Alameda whipsnake occurs within the action area.

GIANT GARTER SNAKE

The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 FR 67046). The Service reevaluated the status of the snake before adopting the final rule. The snake was listed as a threatened species on October 20, 1993 (58 FR 54053-54066). The Service published the *Draft Recovery Plan for the Giant Garter Snake* in July 1999. Additional information on the species' biology is in those documents and in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The giant garter snake is endemic to the valley floor of the Sacramento and San Joaquin Valleys of California. Records coincide with the historical distribution of large flood basins, freshwater marshes, and tributary streams of the Central Valley of California (Hansen and Brode 1980). The historic distribution of the giant garter snake extended from Sacramento and Contra Costa Counties southward to Buena Vista Lake near Bakersfield in Kern County (Fitch 1940). A range map of the species is in Appendix D of the HCP/NCCP.

The snake typically inhabits small mammal burrows and other soil crevices throughout its winter dormancy period (November to mid-March). The snake also uses burrows as refuge from extreme heat during their active period. While the snakes usually remain in close proximity to

wetland habitats, the Biological Research Division (BRD) of the U.S. Geological Service has documented snakes using burrows as much as 50 m (165 ft.) away from the marsh edge to escape extreme heat (Wylie *et al.* 1997). Overwintering snakes have been documented to use burrows as far as 250 m (820 ft.) from the edge of marsh habitat. Snakes typically select south- and west-facing burrows as hibernacula (58 FR 54053-54066).

In studies of marked snakes in the Natomas Basin, snakes moved about 0.40-0.80 kilometers (km)(0.25-0.5 mile) per day (Hansen and Brode 1993). However, total activity varies widely between individuals, and individual snakes moved up to 8 km (5 miles) over the period of a few days in response to dewatering of habitat (Wylie *et al.* 1997). In agricultural areas, snakes were documented using rice fields in 19-20 percent of the observations, marsh habitat in 20-23 percent of observations, and canal and agricultural waterway habitats in 50-56 percent of the observations (Wylie 1998). Telemetry studies have also shown that active snakes use uplands extensively–more than 31 percent of observations were in uplands (Wylie 1998). Almost all snakes observed in uplands during the active season were near vegetative cover, where cover exceeded 50 percent in the area within 0.5 m (1.6 ft) of the snake; less than 1 percent of observations were of snakes in uplands with less than 50 percent cover nearby (Wylie 1998).

Essential Habitat Components

The giant garter snake inhabits agricultural wetlands and associated waterways, including irrigation and drainage canals, rice fields, marshes, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands (Service 1999). The snake feeds on small fishes, tadpoles, and frogs (Fitch 1941, Hansen 1980, Hansen 1988). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows) (Hansen 1980).

Species-Habitat Model

Areas in the action area west of Marsh Creek are not considered within the range of giant garter snake (Hansen pers. comm.). Core habitat was defined as the slough/channel, pond, and stream land-cover type east of Marsh Creek and within or adjacent to pasture and cropland. Movement habitat was defined as pasture, cropland, and ruderal land-cover types within 900 feet of core habitat were considered potential movement and foraging habitat for the giant garter snake. Core or movement habitat not linked to the San Joaquin River through other core or movement habitat was omitted from the model.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the giant garter snake within the action area. There are no occurrence records in the action area. There are 151 miles

of stream habitat modeled as core habitat in the action area. There are 14,016 acres of movement and foraging habitat modeled in the action area.

Reproductive Ecology

The breeding season for the giant garter snake extends from March through May and resumes briefly during September (G. Hansen pers. comm. *in* Service 1999).

Dispersal

Giant garter snakes are most active from early spring through mid-fall (Brode 1990; Hansen and Brode 1993). During the winter, giant garter snakes are generally inactive, although some individuals may bask or move short distances on warmer days (Service 1999). During the active season, giant garter snakes generally remain in close proximity to wetland habitats but can move over 800 feet from the water (G. Hansen 1988; Wylie et al. 1997) during the day. Some individuals may move up to 5 miles over a period of several days, if the conditions of their habitat become unsuitable (Wylie et al. 1997).

Reasons for Decline and Threats to Survival

Habitat loss, degradation, and fragmentation are the primary threats to giant garter snake population viability (Service 1999). Non-native species may have a detrimental effect on giant garter snakes through direct predation (Bury and Whelan 1984; Treanor 1993) and competition (California Department of Fish and Game 1992; G. Hansen 1986; Schwalbe and Rosen 1989). Toxic contamination, particularly from selenium, and impaired water quality have also been identified as threats to some populations of the giant garter snake (Ohlendorf et al. 1986; Saiki and Lowe 1987; 58 FR 54053). Disease and parasitism, (potentially related to reduced immune response ability from contaminants), may also pose a threat to this species (Service 1999).

Status with Respect to Recovery

Conservation actions include the establishment of guidelines and mechanisms to minimize and mitigate take (Service 1999), habitat and population surveys (G. Hansen 1982, 1986, 1996; Hansen and Brode 1980), and development of management plans for public lands and land acquisitions (Service 1999).

Environmental Baseline and Status within the Action Area

Some experts consider Contra Costa County outside the current range of giant garter snake. One historic record of giant garter snake was documented within the action area near Antioch (Hansen pers. comm.). A lack of records in the action area may be due to a lack of surveys and/or that

they occur at such low densities that it is highly unlikely that a trapping effort would detect them. Although this species may have occurred in the action area historically, it may have been extirpated there.

WESTERN POND TURTLE

The northwestern pond turtle (*Clemmys marmorata marmorata*) is a subspecies of the western pond turtle (*C. marmorata*) and it is the subspecies of western pond turtle found in the action area. It is a state Species of Special Concern. In 1993, the Service reviewed the status of the pond turtle and found that listing was not warranted (58 (153) FR 42717-42718). A detailed description of western pond turtle and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The northwestern pond turtle (the local subspecies of the western pond turtle) occurs from Puget Sound in Washington south through the Oregon River drainage in central California, generally west of the Cascade-Sierra crest to the American River. Today, western pond turtle occurs in 90% of its historic range in the Central Valley and west of the Sierra Nevada, but in greatly reduced numbers (Jennings and Hayes 1994). A range map of the species in California is in Appendix D of the HCP/NCCP.

In the majority of its range, western pond turtles are active from about March through October with the peak of activity in May and June in both aquatic and terrestrial habitats. Some turtles overwinter in aquatic sites such as the primary lake or pond they inhabit or other nearby ponds or pools or move to upland habitat. Turtles may move up to 260 m from aquatic habitat to overwinter under dense vegetation, logs or leaf litter (Holland 1994).

Essential Habitat Components

Western pond turtles are found in rivers, streams, lakes, ponds, wetlands, reservoirs, and brackish estuarine waters from sea level to elevations of 1,980 meters (6,500 feet) (Holland 1994; Jennings and Hayes 1994). Western pond turtles use aquatic habitats primarily for foraging, thermoregulation, and avoidance of predators. Western pond turtles overwinter in both aquatic and terrestrial habitats. Aquatic refugia consist of rocks, logs, mud, submerged vegetation, and undercut areas along banks. Terrestrial overwintering habitat consists of burrows in leaf litter or soil.

Species-Habitat Model

All perennial streams, ponds, sloughs/channels, and wetlands in all land-cover types within the action area are considered core breeding habitat for western pond turtle. In addition, areas within

a 150-foot radius of perennial aquatic and wetland habitats, excluding rock outcrops, vineyard, orchard, and developed land cover types are considered suitable (core) nesting habitat for western pond turtles. Seasonal wetlands may not provide suitable breeding habitat for western pond turtles. However, these features were not separated from perennial wetlands in the land cover mapping so all wetlands are considered suitable breeding habitat.

All intermittent streams within the action area provide suitable movement habitat for western pond turtles. Areas within 100-feet of seasonal streams provide suitable overwintering habitat for this species, excluding those seasonal streams and wetlands found in cropland, orchard, vineyard, and all developed land cover types.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the western pond turtle within the action area. Core habitat includes large reaches of Marsh Creek and Kellogg Creek, and the many ponds throughout the action area. Movement habitat is found throughout the western and central portions of the action area in intermittent streams. Approximately 4,325 acres of non-stream core and 6,745 acres of upland habitat were modeled in the action area. Approximately 33 miles of stream core and 321 mile of stream movement habitat were modeled.

Reproductive Ecology

Western pond turtles first breed at 10–14 years of age (Service 1999). Most females lay eggs in alternate years. Clutch size ranges from one to 13 eggs (Holland 1985, 1991). Gravid females leave drying creeks from May through July to oviposit in sunny upland habitats, including grazed pastures. Nesting is usually close to water averaging 28 meters (92 feet) from aquatic habitat (Rathbun et al. 2002). Incubation lasts 80–100 days, and the normal hatch success is approximately 70%. Nest predation rates are high and complete failure of nests is common. Survivorship in western pond turtles apparently is dependent on age. Hatchlings and first year juveniles are subject to low survivorship, averaging ten to 15 percent; survivorship may not increase significantly until turtles are four to five years old (Holland 1994). Once turtles achieve a carapace length of 120 mm, survivorship improves with an average adult turnover rate of three to five percent per year (Holland 1994). Under normal circumstances, western pond turtle populations consist of 55 to 70 percent adults.

Reasons for Decline and Threats to Survival

Numerous factors, including loss, degradation, and fragmentation of habitat; disease; introduced predators and competitors; and other natural and anthropogenic conditions present ongoing threats to western pond turtle throughout 75–80% of its range (Service 1999; Holland 1991).

Habitat loss and alteration are the primary factors that caused the historic decline of the western pond turtle throughout its range. In California, over 90 percent of historic wetlands have been diked, drained and filled primarily for agricultural development and secondarily for urban

development (Frayer *et al.* 1989). Today, the western pond turtle remains in 90 percent of its historic range, but at greatly reduced numbers (Holland 1991).

Another factor that may adversely affect pond turtle populations is the introduction of nonnative competitors. Numerous species of nonnative aquatic turtles have been observed within the range of the pacific pond turtle (Jennings 1987). These include the painted turtle (*Chrysemys picta*), red-eared slider (*Pseudemys scripta elegans*), common snapping turtle (*Chelydra serpentina*), spiny soft-shelled turtle (*Apalone spinifera*), alligator snapping turtle (*Macroclemys temmincki*), stinkpot (*Sternotherus odoratus*), diamondback terrapin (*Malaclemys terrapin*), and the Mississippi map turtle (*Graptemys kohni*). In addition to competition for food, exotic turtles also may carry new pathogens and/or parasites for which pond turtles exhibit no immunity.

Additional nonnative competitors of particular concern are carp (*Cyprinus carpio* and *Carassius auratus*), sunfish (*Lepomis* spp. and *Pomoxis* spp.), and crayfish (*Cambarus*, *Procambarus*, and *Pacifasticus*). Carp alter aquatic habitats by consuming emergent and floating vegetation. Their activities also produce turbid water conditions. These alterations of the aquatic habitat may have a significant impact on hatchling turtle habitat, may reduce the availability of invertebrate prey and decrease turtle foraging success as turtles rely primarily on vision to capture prey (Holland 1991). Sunfish, which are capable of reaching large population sizes in aquatic habitats may modify or compete for the available invertebrate prey base (Holland 1991). Although direct scientific data are unavailable to support this hypothesis, Holland (1991) noted that several sites lacking native or non-native fishes support the largest known pacific pond turtle populations. Crayfish, which also may prey on young pond turtles, may compete with pond turtles for both the invertebrate prey base and carrion (Holland 1991).

Another significant source of habitat alteration throughout the range of the pacific pond turtle is livestock grazing. Livestock have been documented as a major cause of excessive habitat disturbance in riparian areas (Behnke and Raleigh 1978, Kauffman and Krueger 1984). Cattle have a disproportionately greater adverse affect on riparian and other wetland habitats because they tend to concentrate in these areas, particularly during the dry season (Marlow and Pogacnik 1985). Cattle trample and eat emergent vegetation (Platts 1981) that serves as foraging habitat for turtles of all sizes and as critical microhabitat for hatchlings and first year animals. Streambanks also are trampled by cattle often resulting in the collapse of undercut banks (Platts 1981, Kauffman *et al.* 1983) that provided refugia for turtles. Cattle grazing causes increased erosion in the stream (Winegar 1977) which fills in deep pools, increases stream velocity, and adversely affects aquatic invertebrates (Behnke and Raleigh 1978, Platts 1981). Cattle may also crush turtles (Holland 1991).

Recent studies describe populations that have adults but few juveniles, indicating that little or no recruitment is taking place. Because pond turtles are long-lived, nonreproducing populations may persist in isolated wetlands long after recruitment of young has ceased (Holland 1991; Service 1999).

Status with Respect to Recovery

The species is a California endemic, thought to be declining throughout its range. There are no recovery plans for this species. Recruitment is a major limiting factor within the action area, therefore measures should be taken to protect upland nesting habitat from agricultural activities and habitat conversion. To improve the survival of juvenile turtles, nonnative predators such as bullfrogs and warm water fish from its aquatic habitats should be removed from ponds.

Environmental Baseline and Status within the Action Area

This species is commonly found in Marsh Creek through Round Valley south to Morgan Territory. Within the action area the western pond turtle is also known from BDMRP and potential habitat occurs in ponds throughout the Vasco Caves area (S. Bobzien pers. comm.). According to the CNDDB there are 27 documented observations of western pond turtle within the action area, primarily in the Marsh Creek Watershed and in Kellogg Creek at Los Vaqueros Watershed (CNDDB 2004).

California Tiger Salamander

The final rule listing the California tiger salamander as a threatened species was published on August 4, 2004 (69 FR 47212). Critical habitat was designated on August 23,2005 (70 FR 49379). A description of California tiger salamander and its distribution, ecology, and threats is in the final rule and Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The California tiger salamander is endemic to California. Historically, the California tiger salamander probably occurred in grassland habitats throughout much of the state. Currently, the California tiger salamander occurs in six populations from the Central Valley and Sierra Nevada foothills, from Yolo County south to Tulare County, and in the coastal valleys and foothills, from Sonoma County south to Santa Barbara County (Zeiner et al. 1988). A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

Tiger salamanders breed and lay their eggs in vernal pools and other ephemeral ponds that fill in winter and often dry out by summer (Loredo et al. 1996); they sometimes use permanent human-made ponds (e.g., stock ponds), reservoirs, and small lakes that do not support predatory fish or bullfrogs (Stebbins 1972; Zeiner et al. 1988). California tiger salamanders inhabit valley and foothill grasslands and the grassy understory of open woodlands, usually within one mile of water (Jennings and Hayes 1994). They require small-mammal (e.g., California ground squirrel) burrows for cover during the non-breeding season and during migration to and from aquatic

breeding sites (Zeiner et al. 1988). The suitability of California tiger salamander habitat is proportional to the abundance of upland refuge sites that are near aquatic breeding sites. Accessible upland dispersal habitat between occupied locations that allow for movement between such sites is also necessary.

Species-Habitat Model

California tiger salamanders require two major habitat components: aquatic breeding sites and terrestrial aestivation or refuge sites. Breeding habitat was defined as all ponds, wetlands, seasonal wetlands, and alkali wetlands within annual grassland, oak savanna, and oak woodland. All non-urban, non-aquatic land cover types within one mile of potential breeding sites were considered potential migration and aestivation habitat for this species.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the California tiger salamander in the HCP/NCCP action area. The large proportion of the modeled habitat within non-urban areas is due to the large number of ponds that provide potential breeding habitat and the potential dispersal distance of this species. There are 538 acres of modeled breeding habitat and 102,034 acres of migrations/aestivation habitat.

Reproductive Ecology

Adult California tiger salamanders migrate to and congregate at aquatic breeding sites during warm rains, primarily between November and February (Shaffer and Fisher 1991; Barry and Shaffer 1994). Spawning usually occurs within a few days after migration, and adults probably leave the breeding sites at night soon after spawning (Storer 1925 in Barry and Shaffer 1994). Larvae develop rapidly, and metamorphosis begins in late spring or early summer (Loredo-Prendeville 1995). At least 10 weeks are required to complete metamorphosis (Feaver 1971). Juveniles disperse from aquatic breeding sites to upland habitats after metamorphosis (Storer 1925; Holland et al. 1990).

Dispersal

Dispersal of juveniles from natal ponds to underground refugia occurs during summer months, when breeding ponds dry out. Research has shown that dispersing juveniles can roam up to one mile from their breeding ponds and that a minimum of 480 acres of uplands habitat is needed surrounding a breeding pond in order for the species to survive over the long term. Reserves of multiple breeding ponds surrounded by 1,000 acres or more of habitat are recommended to ensure the persistence of the species.

Reasons for Decline and Threats to Survival

California tiger salamander populations have declined as a result of two primary factors: widespread habitat loss and habitat fragmentation. Overall, approximately 75% of habitat for California tiger salamander within its historic range has been lost (Fisher and Shaffer 1996). The introduction of bullfrogs, Louisiana red swamp crayfish, and non-native fishes into aquatic habitats has also contributed to declines in tiger salamander populations (Jennings and Hayes 1994; 59 FR 18353–18354, April 18, 1994; 65 FR 3095). Rodent control through destruction of burrows and release of toxic chemicals into burrows can cause direct mortality to individual salamanders and may result in a decrease of available modeled habitat (65 FR 3095). California tiger salamanders readily attempt to cross roads during migration, and roads that have heavy vehicle traffic or barriers that impede seasonal migrations impacted tiger salamander populations in some areas (Shaffer and Fisher 1991; Shaffer and Stanley 1992; Barry and Shaffer 1994). Hybridization between California tiger salamander and an introduced congener, *A. tigrinum*, has been documented and may be extensive (Riley et al. 2003).

The specific effects of disease on the Central California tiger salamander are not known. Pathogens, fungi, water mold, bacteria, and viruses have been known to adversely affect other tiger salamander species or other amphibians. Pathogens are suspected of causing global amphibian declines (Davidson et al. 2003). Pathogen outbreaks have not been documented in the Central California tiger salamander, but Chytrid fungus infections (chytridiomycosis) have been detected in Central California tiger salamanders (Padgett-Flohr 2004). Chytridiomycosis and ranaviruses are a potential threat to the California tiger salamander because these diseases have been found to adversely affect other amphibians, including tiger salamanders (Longcore in litt. 2003; Lips in litt. 2003). Nonnative species, such as bullfrogs and nonnative tiger salamanders, are both located within the range of the Central California tiger salamander and have been identified as potential carriers of these diseases. Disease will likely become a growing threat because of the relatively small, fragmented remaining Central California tiger salamander breeding sites, the many stresses on these sites due to habitat losses and alterations, and the many other potential disease-enhancing anthropogenic changes that have occurred both inside and outside the species' range.

Status with Respect to Recovery

The California tiger salamander is a federally threatened and California Species of Special Concern within the action area. Its status statewide is considered declining. Status within the action area is unknown. Critical habitat was recently designated but there is none in the action area.

The East Bay and Livermore Valley populations comprise a genetically distinct region within the California tiger salamander's distribution (Shaffer and Trenham 2005). Also, the East Bay and Sacramento Valley populations may be the most genetically diverse populations, suggesting that those regions may comprise the core of the species' distribution, and are of particularly high conservation value (Shaffer and Trenham 2005). However, the East Bay and Livermore Valley

areas have undergone intensive urban development in recent years (California Department of Conservation 1996, 1998, 2000, 2002). Most of the California tiger salamander natural historic habitat (vernal pool grasslands) available in this region has been lost due to urbanization and conversion to intensive agriculture (Keeler-Wolf and Elaml 1998). California tiger salamanders are now primarily restricted to artificial breeding ponds, such as bermed ponds or stock ponds, which are typically located at higher elevations (CNDDB 2006).

Shaffer et al. (1993) found that Alameda and Contra Costa supported the greatest concentrations of California tiger salamander. California tiger salamander populations in the Livermore Valley are severely threatened by the ongoing conversion of grazing land to urban development and vineyards (Stebbins 1989; EBRPD 1999). Proposed land conversion continues to target large areas of California tiger salamander habitat. One such project in Alameda County totals 700 acres (283 hectares) (EBRPD 2003).

Existing conservation measures for this species include preservation of occupied habitat, replacement of lost habitat, and prevention of contamination of aquatic habitat used by the species.

Environmental Baseline and Status within the Action Area

The location database for the California tiger salamander within the action area includes 96 data records dated from 1920 to 1999. Of these records, 45 were documented within the past 10 years. Of the 45 records, all are considered extant, and 37 are mapped at a "specific" precision level (within 80 meters).

Because a comprehensive survey for the California tiger salamander has not been conducted in the action area, neither the current population size nor the locations of all occurrences are known.

CALIFORNIA RED-LEGGED FROG

The red-legged frog was listed as a threatened species on May 23, 1996 (61 FR 25813). Critical habitat was designated on April 13, 2006 (71 FR 19243). Please refer to the final rule and the Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*) (Service 2002b) and Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The historical range of the California red-legged frog extended along the coast from Point Reyes National Seashore, Marin County, California and inland from Redding, Shasta County southward to northwestern Baja California, Mexico (Jennings and Hayes 1985; Hayes and Krempels 1986). The current distribution of this species is in isolated localities in the Sierra Nevada, northern Coast, and Northern Traverse Ranges. It is still common in the San Francisco Bay area and along the central coast. It is believed to be extirpated from the southern Transverse and Peninsular

Ranges (Service 2002b). A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

Almost all of the documented occurrences of this species are located below 3,500 feet. Breeding sites include a variety of aquatic habitats—larvae, tadpoles, and metamorphs use streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, and lagoons. Breeding adults are commonly found in deep (more than two feet), still or slow-moving water with dense, shrubby riparian or emergent vegetation (Hayes and Jennings 1988). Stock ponds are used by this species.

Species-Habitat Model

Breeding sites used by California red-legged frogs include a variety of aquatic habitats (Stebbins 1985; Hayes and Jennings 1988; Service 2002b). Ponds and streams in riparian woodland/scrub, wetland or seasonal wetland, annual grassland, alkali grassland, oak savanna, oak woodland, chaparral, non-urban ruderal (ruderal land cover areas outside existing urban land cover areas) and turf land-cover types were considered potential breeding habitat for California red-legged frog. Streams in urban areas that are connected hydrologically to suitable breeding streams were also considered potential breeding habitat for this species.

All non-urban non-aquatic land cover types within one mile of potential breeding sites were considered potential migration and aestivation habitat for this species. Ponds in urban areas with substantial areas of suitable aestivation habitat intact (>50% of 1-mile buffer) were considered to be suitable breeding habitat unless absence was verified by recent surveys.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the California red-legged frog within the action area. The large size of the habitat is due to the high number of ponds that provide potential breeding habitat and the potential dispersal distance of this species. Two aquatic sites in Brentwood are surrounded by urban development but may still support this species. Until these surveys are complete, presence at these sites is assumed. There are 137 acres of pond breeding habitat and 361 miles of stream breeding habitat modeled in the action area. There are 114,140 acres of upland movement habitat and 36 miles of stream movement habitat modeled in the action area.

Reproductive Ecology

California red-legged frogs breed from November through April (Storer 1925; Service 2002b). Females lay egg masses containing about 2,000 to 5,000 eggs, which hatch in 6 to 14 days, depending on water temperatures (Service 2002b). Larvae metamorphose in 3.5 to 7 months, typically between July and September (Storer 1925; Wright and Wright 1949; Service 2002b).

Dispersal

During dry periods, California red-legged frogs are seldom found far from water. However, during wet weather, individuals may make overland excursions through upland habitats over distances up to 2 miles. During summer, California red-legged frogs may disperse from their breeding habitat to forage and seek summer habitat if water is not available (Service 2002b).

Reasons for Decline and Threats to Survival

Activities that threaten the California red-legged frog are those that result in the degradation, fragmentation, and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, nonnative plants, impoundments, water diversions, degraded water quality, and introduced predators. Over 90% of the historic wetlands in the Central Valley have been lost due to conversion for agriculture or urban development (Service 1978; Dahl 1990). Habitat along many stream courses has also been isolated and fragmented, resulting in reduced connectivity between populations and lowered dispersal opportunities. In a comprehensive evaluation of prevailing hypotheses on the causes of declines in the California red-legged frog populations, Davidson et al. (2001) concluded that wind-borne agrochemicals may be an important factor.

The California red-legged frog may be susceptible to many of the same pathogens, fungi, water mold, bacteria, and viruses have been known to adversely affect tiger salamander species or other amphibians. As with the California tiger salamander, Chytridiomycosis and ranaviruses is a developing concern for California red-legged frog populations. As mentioned for the California tiger salamander, nonnative species, such as bullfrogs and nonnative tiger salamanders, are both located within the range of the California red-legged frog and have been identified as potential carriers of these diseases. Disease is becoming a growing threat because of the relatively small, fragmented remaining California red-legged frog breeding sites, the many stresses on these sites due to habitat losses and alterations, and the many other potential disease-enhancing anthropogenic changes that have occurred both inside and outside the species' range.

Status with Respect to Recovery

Numerous conservation efforts have been undertaken by various federal, state, and local and private organizations to minimize impacts and establish preserves and protective policies to ensure the viability of this species (Service 2002b). The recovery plan calls for the preservation of all known populations and their habitat, the establishment of a viable metapopulation, development of effective land use policies and guidelines, continued research on the ecological requirements of California red-legged frogs necessary for conservation, continued monitoring, and the establishment of an outreach program. Critical habitat was designated in 2001 (66 FR 14626) but rescinded in 2002 by court order except for one unit in the Sierra Nevada. It was proposed again in 2004 and a final rule was issued in April 2006. Lands with conservation plans, including the action area of the HCP/NCCP were excluded from the designation (71 FR 19243).

Environmental Baseline and Status within the Action Area

Contra Costa and Alameda Counties contain the majority of known California red-legged frog occurrences in the San Francisco Bay Area (Service 2002b). However, this species seems to have been nearly eliminated from the western lowland portions of these counties, particularly near urbanization. Eighty-one occurrences of California red-legged frogs have been documented within the action area (CNDDB 2001). Sizeable breeding populations are also found at Sand Creek (BDMRP) and Round Valley Regional Preserve (S. Bobzien in lit. cited in Service 2002b). Some of the highest densities of California red-legged frog ever recorded occur in many of the stock ponds within the Los Vaqueros watershed. In April 2000, the Service issued a biological opinion (1-1-99-F-93) to Reclamation on the construction and operating effects of Los Vaqueros Reservoir on California red-legged frog in the Contra Costa County. Los Vaqueros Reservoir is located approximately seven miles south of Brentwood in an unincorporated area of the County. The project incorporates approximately 19,000 acres of land. The reservoir inundates approximately 1,460 acres. Approximately 6,500 acres of these lands are managed as specified management lands for listed species. This includes, but is not limited to, modifying grazing, pond maintenance, and rodenticide practices thereby enhancing habitat for red-legged frogs. Although management of the entire watershed is primarily to protect water quality, direct and indirect actions to protect water quality will also benefit California red-legged frogs.

FOOTHILL YELLOW-LEGGED FROG

A detailed description of foothill yellow-legged frog and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

Historically, foothill yellow-legged frogs occurred from west of the crest of the Cascade Mountains in Oregon south to the Transverse Ranges in Los Angeles County, and in the Sierra Nevada foothills south to Kern County (Zweifel 1955; Stebbins 1985). An isolated population was reported in Sierra San Pedro Martir, Baja Mexico (Loomis 1965). The current range excludes coastal areas south of northern San Luis Obispo County and foothill areas south of Fresno County where the species is apparently extirpated (Jennings and Hayes 1994). Its known elevation range extends from near sea level to approximately 2,040 meters above sea level (Stebbins 1985). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Foothill yellow-legged frogs require shallow, flowing water in small to moderate-sized streams with at least some cobble-sized substrate (Hayes and Jennings 1988; Jennings 1988). Foothill yellow-legged frogs are usually absent from habitats where introduced aquatic predators are present (Hayes and Jennings 1986, 1988; Kupferberg 1994).

Species-Habitat Model

Perennial streams in riparian woodland/scrub, grassland, oak savanna, and oak woodland land cover types were modeled as core habitat. Other streams in riparian woodland/scrub, grassland, oak savanna, and oak woodland land cover types were modeled as migration habitat.

Figure 2 in Appendix D of the HCP/NCCP shows the modeled habitat of the foothill yellow-legged frog within the action area. Suitable breeding habitat appears to be present in six distinct areas in the action area that maintain perennial stream flows and pass through suitable land-cover types. The only stable and naturally occurring potential habitat for the species occurs in upper Marsh Creek, lower Sand Creek, and tributaries to Mount Diablo Creek in Clayton. Most other stream reaches above the urban and agricultural lowlands are shown as migration habitat. There are no documented occurrences of foothill yellow-legged frogs in the action area but the species is expected to occur in modeled habitat. There are 22 miles of breeding habitat and 272 miles of migration habitat modeled in the action area.

Reproductive Ecology

Foothill yellow-legged frogs in California generally breed between March and early June (Storer 1925; Grinnell et al. 1930; Wright and Wright 1949; Jennings and Hayes 1994). After oviposition, a minimum of approximately 15 weeks is required to reach metamorphosis, which typically occurs between July and September (Storer 1925; Jennings 1988).

Reasons for Decline and Threats to Survival

Habitat loss and degradation, introduction of nonnative predators, and toxic chemicals (including pesticides) pose continued and increasing threats to the long-term viability amphibians throughout California (Jennings and Hayes 1994). In addition, poorly timed water releases from upstream reservoirs can scour egg masses of this species from their oviposition substrates (Jennings and Hayes 1994), and decreased flows can force adult frogs to move into permanent pools, where they may be more susceptible to predation (Hayes and Jennings 1988). The same diseases that effect California tiger salamander and California red-legged frogs (see above) effect foothill yellow-legged frogs

Status with Respect to Recovery

The principal conservation measures necessary for maintaining viable populations of this species include habitat preservation, restoration, and management to retain ecological conditions necessary for survival and population growth. Information on the following topics is needed: a) the range of ecological conditions that can be tolerated, b) the habitat requirements of larvae and early postmetamorphic states, c) the variation in flow and shear conditions that egg masses and larvae will tolerate, and d) the critical thermal maxima of the embryonic stages (Jennings and

Hayes 1994). The statewide status of the species is declining. Its status in the action area is unknown.

Environmental Baseline and Status within the Action Area

Foothill yellow-legged frogs are likely to occur in the few perennial streams and stream segments in the action area including upper Marsh Creek and upper Mount Diablo Creek. There are 11 documented occurrences of foothill yellow-legged frog in Contra Costa County—eight locations are believed to be extirpated and three locations in the Mount Diablo region. There are no known occurrences in the action area.

LONGHORN FAIRY SHRIMP

The longhorn fairy shrimp was listed as an endangered species on September 19, 1994 (59 FR 48136). Critical habitat was designated on February 10, 2006 (70 FR 46924). Please refer to the final rule and the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005) for more detailed information on its distribution, ecology, and threats on this species. Information on the longhorn fairy shrimp is found in the Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

Only eight populations of the longhorn fairy shrimp are known (Service 1996). The type specimen was collected from a sandstone outcrop pool on the Souza Ranch, which is located within the action area. Longhorn fairy shrimp occurrences are rare and highly disjunct with the specific pool characteristics largely unknown (68 FR 22724 and 71 FR 7118). The Altamont Pass subunits of the species occur within clear depression pools in sandstone outcrops (Eriksen and Belk 1999; CNDDB2002. A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

Longhorn fairy shrimp in Contra Costa and Alameda Counties are primarily reported from water pooled in sandstone depressions. Vernal pools in other parts of California that support these fairy shrimp are either loam or sandy loam or shallow, alkaline pools (71 FR 7118).

A distribution model could not be developed for the longhorn fairy shrimp because suitable microhabitats (sandstone vernal pools) occur at too small a scale to be mapped in the action area.

Reproductive Ecology

Beyond inundation of the habitat, the specific cues for hatching are unknown (Eriksen and Belk 1999), although temperature is believed to play a large role.

Dispersal

Predator consumption of fairy shrimp cysts aids in distributing populations of fairy shrimp. If conditions are suitable, transported cysts may hatch at new locations and establish a new population. Cysts can also be transported in mud carried on the feet of animals, including livestock that may wade through their habitat (Rogers In prep.).

Reasons for Decline and Threats to Survival

Threats to the species include the conversion of vernal pool habitat and extinction because of the small and isolated nature of remaining populations (59 FR 48136). Recolonization opportunities are also diminished when physical barriers, such as development or lack of vernal pool habitat, isolate populations from one another or inhibit transport of cysts. Damaging the impermeable clay and /or hardpan layers of the habitat bottom, filling in the habitat, altering (e.g., through contaminants) or destroying the watershed that conveys overland flow into the habitat may threaten the species. Additionally, introduction of non-native plants, destruction or degradation of the surrounding upland habitat, introduction of fish, and activities that would discourage or prevent waterfowl and waders from feeding at occupied habitats and thereby restrict gene flow between populations would also significantly affect longhorn fairy shrimp populations. In the Livermore Vernal Pool Region, occurrences in the Altamont pass area in Contra Costa and Alameda Counties may be threatened by ongoing and future wind energy developments (Eng et al. 1990).

Status with Respect to Recovery

In August 2003, the Service designated critical habitat for 4 vernal-pool crustaceans and 11 vernal pool plants (68 FR 46683). This designation was revised in August 2005 (Service 2005), with final maps published in February 2006 (71 FR 7118).

All critical habitat within the action area is protected within Vasco Caves Regional Preserve owned and managed by EBRPD, and on adjacent conservation easements held by EBRPD. The species' status in the action area outside critical habitat is unknown.

Environmental Baseline and Status within the Action Area

The statewide status of the species is declining. Longhorn fairy shrimp within the action are only known to occur in sandstone rock outcrop vernal pools within Vasco Caves Regional Preserve

and in similar pools on adjacent conservation easements. Thus, all known populations of longhorn fairy shrimp in the action area are protected. Additional populations may be present in unsurveyed vernal pools and other seasonal wetlands. The species' population trend in the action area is unknown but may be stable due to the protection of all known populations.

VERNAL POOL FAIRY SHRIMP

On September 19, 1994, the final rule to list the vernal pool fairy shrimp as threatened was published. (59 FR 48136). Critical habitat was designated on February 10, 2006 (71 FR 7118). A detailed description of vernal pool fairy shrimp and its distribution, ecology, and threats is in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005) and Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The vernal pool fairy shrimp is found from Jackson County near Medford, Oregon, throughout the Central Valley, and west to the central Coast Ranges. Isolated southern populations occur on the Santa Rosa Plateau and near Rancho California in Riverside County (Eng et al. 1990; Eriksen and Belk 1999). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

This species is usually associated with vernal pools but are also found in association with other ephemeral habitats including alkali pools, seasonal drainages, stock ponds, vernal swales, and rock outcrops. Critical habitat within the action area contains the only known location of vernal pool fairy shrimp in sandstone outcrop pools Examples of artificially created ephemeral habitats include railroad toe-drains, roadside ditches, abandoned agricultural drains, ruts left by heavy construction vehicles, and depressions in firebreaks (Eng et al. 1990).

A species distribution model could not be developed because suitable microhabitats occur at too small a scale to be mapped in the action area.

Reproductive Ecology

The life span of the vernal pool fairy shrimp is relatively short, allowing it to hatch, mature to adulthood, and reproduce during the short time period when vernal pools dry. Vernal pool fairy shrimp eggs may remain dormant in the soil when the vernal pool habitats are dry. Beyond inundation of the habitat, the specific cues for hatching are unknown although temperature is believed to play a large role. (Eriksen and Belk 1999).

Dispersal

The primary historical dispersal method for the vernal pool fairy shrimp may have been large-scale flooding resulting from winter and spring rains that allowed the animals to colonize different individual vernal pools and other vernal pool complexes. This dispersal mechanism may no longer function in some areas due to the construction of dams, levees, and other flood control measures, and widespread urbanization within significant portions of the range of this species. Waterfowl and shorebirds are now considered the primary dispersal agents for vernal pool tadpole shrimp and vernal pool fairy shrimp (Brusca and Brusca 1992, Simovich *et al.* 1992). The eggs of these crustaceans are ingested (Krapu 1974, Swanson 1974, Driver 1981, Ahl 1991) and/or adhere to the legs and feathers where they are transported to new habitats.

Reasons for Decline and Threats to Survival

The ephemeral wetlands that support this network of populations are remnants of what was formerly a pristine vernal pool ecosystem, which has been converted to primarily agricultural and urban uses. This highly disturbed remnant habitat is imperiled by a variety of human-caused activities, primarily urban development, water supply/flood control projects and conversion of land to agricultural use.

Holland (1978) estimated that between 60 and 85 percent of the habitat that once supported vernal pools, had been destroyed by 1973. Since 1973, a substantial amount of remaining habitat has been converted for other uses. The rate of loss of vernal pool habitat in the state has been estimated at two to three percent per year (Holland and Jain 1988).

Conversion of natural habitat for urban and agricultural uses has highly fragmented the habitat of the listed vernal pool crustaceans throughout their ranges. Fragmentation such as this results in small isolated fairy shrimp populations. Ecological theory predicts that such populations will be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance. If an extinction event occurs in a population that has been fragmented, the opportunities for recolonization are thought to be greatly reduced due to physical (geographical) isolation from other (source) populations (Gilpin and Soule 1986; Goodman 1987).

Status with Respect to Recovery

The conservation of vernal pool fairy shrimp is directly tied to the conservation of suitable vernal pool habitat. The only vernal pools in the action area that have been preserved occur around the Byron Airport (Byron Habitat Mitigation Lands, owned and managed by Contra Costa County) and in Cowell Ranch State Park. The species' status statewide is declining.

Environmental Baseline and Status within the Action Area

The species' status in the action area is unknown. However, six records for this species exist in the action area. A paucity of data points is probably due to a lack of survey effort. Existing vernal pool fairy shrimp records include numerous occupied pools on the Cowell Ranch on the northeast side of Mount Diablo, artificial pools in a railroad access road near Pittsburgh, and pools around the Byron Airport (Stromberg and Ford 2003). Critical habitat for the species includes the Altamont Hills Unit 19, which is the only known location that supports vernal pool fairy shrimp in sandstone outcrop pools. This unit lies north of Corral Hollow Road, west of Clifton Court Forebay, east of Danville, southeast of Concord, and south of Antioch (71 FR 7118-7316).

MIDVALLEY FAIRY SHRIMP

A detailed description of midvalley fairy shrimp and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

Midvalley fairy shrimp is endemic to California Central Valley grassland vernal pools (Belk and Fugate 2000). Known occurrences include scattered populations from the Mather Field area of Sacramento south through Galt from Sacramento County; the Jepson Prairie, Travis Air Force Base, and Vacaville areas in Solano County; from Lodi north to the county border in San Joaquin County; the Byron Airport in Contra Costa County; the Virginia Smith Trust (Haystack Mountain) and Arena Plains National Wildlife Reserve in Merced County; one location in central Madera County; and one in northern Fresno County (Eriksen and Belk 1999; Belk and Fugate 2000; Rogers in prep.). A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

Typical habitat for special-status fairy shrimp in California includes vernal pools, seasonally ponded areas within vernal swales, rock outcrop ephemeral pools, playas, and alkali flats as well as certain artificial habitats (e.g., railroad toe-drains, roadside ditches, abandoned agricultural drains, ruts left by heavy construction vehicles, and depressions in fire breaks) (Eng et al. 1990). Typically, the midvalley fairy shrimp is found in small, shallow, "flashy" vernal pools that only pond for 4 days.

A species distribution model could not be developed because suitable microhabitats occur at too small a scale to be mapped in the action area.

Reproductive Ecology

Other than inundation of the habitat, the specific cues for hatching are unknown (Eriksen and Belk 1999), although temperature is believed to play a large role. Typically, midvalley fairy shrimp mature in about 16 days once water temperatures reach at least 20°C (Eriksen and Belk 1999). However, midvalley fairy shrimp can hatch, mature, and produce viable cysts in 4 days under extreme circumstances (Rogers in prep.).

Dispersal

See description in vernal pool fairy shrimp section above.

Reasons for Decline and Threats to Survival

See description in vernal pool fairy shrimp section above.

Status with Respect to Recovery

Conservation of the midvalley fairy shrimp is directly tied to conservation of suitable vernal pool and other seasonal wetland habitat. The rapid life cycle of this species (as little as 4 days) can also result in a lack of detections even while conducting protocol surveys. Status statewide and range wide is declining. Status in the action area is unknown.

Environmental Baseline and Status within the Action Area

A single record for this species exists near the Byron Airport. The paucity of data points in the action area is likely due to a lack of survey effort and the difficulty of detecting this species.

VERNAL POOL TADPOLE SHRIMP

On September 19, 1994, the final rule to list the vernal pool tadpole shrimp as endangered was published. (59 FR 48136). Critical habitat was designated on February 10, 2006 (71FR 7118) A detailed description of vernal pool tadpole shrimp and its distribution, ecology, and threats is in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005, 2002b) and Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Range, Movements

The vernal pool tadpole shrimp is a California Great Central Valley endemic species, with the majority of the populations occurring in the Sacramento Valley. This species has also been

reported from the Sacramento River Delta to the east side of San Francisco Bay, and from a few scattered localities in the San Joaquin Valley from San Joaquin County to Madera County (Rogers 2001). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Vernal pool tadpole shrimp occur in vernal pools, clay flats, alkaline pools, ephemeral stock tanks, roadside ditches, and road ruts (Rogers 2001; CNDDB 2001) ranging in size from very small, clear, well-vegetated vernal pools to highly turbid, alkali scald pools to large winter lakes. Typically the vernal pool tadpole shrimp is found in habitats that are deeper than 12 centimeters, pond for 15 to 30 days, and do not suffer wide daily temperature fluctuations (Rogers 2001). However, tolerances of this species to specific environment conditions have yet to be determined.

No species distribution model could be developed because suitable microhabitats occur at too small a scale to be mapped in the action area.

Reproductive Ecology

Cysts may hatch at various times, anywhere from 1 hour to 3 weeks after the pools are inundated. The exact hatching stimuli are unknown. The vernal pool tadpole shrimp mature more slowly than fairy shrimp, and are longer lived. Typically, adults will survive until the vernal pool dries or until temperatures of 10 to 15 degrees Celsius are reached. Vernal pool tadpole shrimp can begin shedding cysts in as little as 15 days.

Dispersal

See description in vernal pool fairy shrimp section above.

Reasons for Decline and Threats to Survival

See description in vernal pool fairy shrimp section above.

Status with Respect to Recovery

Conservation of the vernal pool tadpole shrimp is directly tied to conservation of suitable vernal pool and other suitable seasonal wetland habitat. Status statewide is declining.

Environmental Baseline and Status within the Action Area

The vernal pool tadpole shrimp is not known to be present within the action area. However, due to the presence of modeled habitat and populations within close proximity to the action area, unrecorded populations may be present in vernal pool and swale habitat of the non-native annual grassland and in other depressions that seasonally collect rainwater. The lack of data points within the action area is probably due to a lack of survey effort.

MOUNT DIABLO MANZANITA

A detailed description of Mount Diablo manzanita and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Mount Diablo manzanita is endemic to Contra Costa County, where it occurs only on Mount Diablo and in the adjacent foothills. It is found between 700 and 1,860 feet above sea level. A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Mount Diablo manzanita occurs primarily in chamise or manzanita chaparral. It can also be found as an understory shrub in coast live oak woodland. It occurs primarily in canyons and on slopes, and is typically found on soils derived from sandstone (CNDDB 2005).

Species-Habitat Model

Modeled habitat is assumed to be chaparral/scrub between 700 and 1,860 feet in elevation. Figure 2 in Appendix D of the HCP/NCCP shows the modeled Mount Diablo manzanita habitat in the action area. The habitat is restricted to the eastern and northern flanks of Mt. Diablo. There are 2,011 acres of modeled habitat in the action area.

Life History and Reproductive Ecology

Mount Diablo manzanita regenerates by recruiting new individuals from seed, rather than by resprouting after fire like some manzanita species (Jepson 1922). Fire is necessary to allow the establishment of new plants from seeds by removing the overtopping vegetation; it may also stimulate seed germination.

Reasons for Decline and Threats to Survival

Mount Diablo manzanita is restricted to a few occurrences in a limited area, but it does not appear to be seriously threatened (CNPS 2007). Potential threats to Mount Diablo manzanita include direct loss of plants and disturbance that could alter the stand composition. Direct loss of plants could occur from clearing for firebreaks, trail maintenance, road maintenance, and facilities development (CNDDB 2005). Activities such as grazing, off-road vehicle use, and dumping cause disturbances that could alter the interaction between chaparral and the adjacent plant communities or allow invasion by exotic species.

Status with Respect to Recovery

The CNPS List code for the Mount Diablo manzanita is 1B.3, meaning that the species, while restricted to a small number of occurrences in a limited area within California, is not severely threatened CNPS 2007). The global and statewide status of the species is unknown.

Environmental Baseline and Status within the Action Area

Fourteen occurrences of Mount Diablo manzanita are known within the inventory area (12 of these have location data). Ten of these occurrences are in Mount Diablo State Park, on EBRPD lands, or on other public lands. The status in the action area is unknown.

BRITTLESCALE

A detailed description of brittlescale and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Brittlescale occurs along the western side of the Great Valley from Glenn County to Merced County and in the small valleys of the inner Coast Ranges, including the Livermore Valley. It occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major streams draining from the inner Coast Range foothills. It is generally found at low elevations but has been collected up to 1,055 feet above sea level. A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Brittlescale occurs on alkali soils of the Pescadero and Solano series (Soil Conservation Service 1977). The species typically occurs in barren areas within alkali grassland, alkali meadow, and alkali scrub. It is occasionally found on the margins of alkali vernal pools (CNDDB 2005).

Species-Habitat Model

Modeled habitat is assumed to be all alkali grasslands and alkali wetlands on soils of the Pescadero or Solano soil series (Soil Conservation Service 1977). Figure 2 in Appendix D of the HCP/NCCP shows the modeled brittlescale habitat in the action area. The habitat is restricted to alkali soils in the southeastern region of the action area. Some modeled habitat is found in the Los Vaqueros Watershed and on the Byron Airport conservation easements. The majority of modeled habitat is found on private lands. There are 1,633 acres of modeled habitat in the action area.

Life History

Brittlescale is an annual species whose inflorescence resembles that of the closely related Parrish's brittlescale, which produces male flowers mostly in the upper leaf axils and female flowers mostly in the lower leaf axils (Munz 1974). Brittlescale flowers between May and October, and produces seeds that are 1–1.5 mm in size (Hickman 1993).

Reasons for Decline and Threats to Survival

The principal threat to brittlescale has been the historic conversion of much of the alkali grassland to agriculture. Present threats include flooding of alkali grassland to create waterfowl habitat, grazing, and urban development (CNDDB 2005; CNPS 2005).

Status with Respect to Recovery

The CNPS list code for brittlescale is 1B.2, meaning that the species, while restricted to a relatively small number of occurrences (40 documented occurrences; Preston pers. comm.) in a limited area within California, is fairly endangered (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

Nine occurrences of brittlescale are present in the action area (CNDDB 2005; Mundie & Associates and City of Antioch 2002). Four occurrences are on Los Vaqueros Reservoir or other public lands. One occurrence is on private lands near Antioch; all others are on private lands south and west of Byron. The status in the action area is unknown, but is probably stable or declining.

SAN JOAQUIN SPEARSCALE

A detailed description of San Joaquin spearscale and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

San Joaquin spearscale occurs along the western side of the Great Valley from Glenn County to Merced County and in the small valleys of the inner Coast Ranges, including the Livermore Valley. It occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major streams draining from the inner Coast Ranges foothills. It is generally found at low elevations, but has been collected up to 1,055 feet above sea level. A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

San Joaquin spearscale typically occurs in alkali grassland and alkali meadow, or on the margins of alkali scrub. It occurs on clay soils, often in areas of high alkalinity. No species-habitat model was created for San Joaquin spearscale.

Life History

San Joaquin spearscale is an annual species that produces a dense spike-like inflorescence of male flowers mostly in the upper leaf axils, and female flowers mostly in the lower leaf axils (Hickman 1993). The species flowers between April and October and produces seeds that are 1-1.5 mm in size (Hickman 1993).

Reasons for Decline and Threats to Survival

The principal threat to San Joaquin spearscale has been the historic conversion of much of the alkali grassland to agriculture. Present threats include habitat conversion to urban use, overgrazing, and impacts associated with road and utility line construction and maintenance (CNDDB 2007)

Status with Respect to Recovery

The CNPS list code for San Joaquin spearscale is 1B.2, meaning that the species is restricted to a relatively small number of occurrences (40 documented occurrences) in a limited area within California and is fairly endangered (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

Thirty-two occurrences of San Joaquin spearscale are found within the action area (CNDDB 2005; Jones & Stokes Associates 1989; Mundie & Associates and City of Antioch 2002). Most of the occurrences are within the Los Vaqueros Watershed. Some occurrences are on private lands in the central portion of the action area, including within Lone Tree Valley, Briones Valley, and the Brushy Creek watershed south of Byron. The status in the action area is unknown, but is probably stable or declining.

BIG TARPLANT

A detailed description of big tarplant and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Big tarplant is endemic to the Mount Diablo foothills and is found primarily in eastern Contra Costa, eastern Alameda, and western San Joaquin Counties (Hoover 1937). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Big tarplant occurs in annual grassland on clay to clay-loam soils, usually on slopes and often in burned areas, below 1,500 feet (CNDDB 2005). In Contra Costa County, the occurrences are primarily on soils of the Altamont series.

Species-Habitat Model

Primary habitat is assumed to be annual grassland below 1,500 feet on the Altamont soil series (Soil Conservation Service 1977). Low potential habitat is assumed to be all other annual grassland below 1,500 feet. Figure 2 in Appendix D of the HCP/NCCP shows the modeled big tarplant habitat in the action area. There are 34,265 acres of modeled primary habitat and 22,091 acres of modeled low potential habitat in the action area.

Life History and Reproductive Ecology

Big tarplant's blooming period, during which the plants produce many heads with white flowers, generally occurs between August and October. Gregory *et. al.*(2001) found that disc seeds of this species germinate at much higher frequencies than ray seeds.

Reasons for Decline and Threats to Survival

The primary threat to big tarplant has been habitat loss from conversion to urban development. Ground disturbance and erosion caused by cattle grazing and competition from invasive exotics such as yellow star-thistle (*Centaurea solstitialis*) poses a threat to populations (CNDDB 2005).

Status with Respect to Recovery

The CNPS list code for big tarplant is 1B.1, meaning that big tarplant occurs in only a few highly restricted populations and is endangered throughout its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

In the action area, big tarplant is known from four occurrences on Cowell Ranch, west of Brentwood, and seven occurrences on Roddy Ranch, south of Antioch (CNDDB 2005). The historic occurrences in Antioch are likely to have been extirpated, although at least one population is present at BDMRP (Preston pers. comm.). Big tarplant may also be present in the hills south of Pittsburg, where it was collected in 1937 and last seen in 1992 (Preston pers. comm.). The status in the action area is unknown, but is probably stable or declining.

Mount Diablo Fairy Lantern

A detailed description of Mount Diablo fairy-lantern and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Mount Diablo fairy-lantern is endemic to the Diablo Range in Contra Costa County, ranging in elevation between 650 and 2,600 feet (Hickman 1993). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Mount Diablo fairy-lantern grows on grassy slopes and in openings in chaparral and oak woodland communities (CNDDB 2005).

Species-Habitat Model

Modeled habitat is assumed to be annual grassland, chaparral/scrub, oak woodland, and oak savannah between 650 feet and 2,600 feet in elevation. Figure 2 in Appendix D of the HCP/NCCP shows the modeled Mount Diablo fairy-lantern habitat in the action area. All modeled habitat occurs within the western third of the action area. There are 48,848 acres of modeled habitat in the action area.

Life History and Reproductive Ecology

Mount Diablo fairy-lantern is bulbiferous perennial herb that blooms from April through June, producing bright yellow, pendant flowers. Fiedler (1987) reported that the Mount Diablo fairy lantern has low seed survival and seedling establishment, low adult mortality and slow growth.

Reasons for Decline and Threats to Survival

Threats to Mount Diablo fairy-lantern include grazing, road and trail maintenance, excessive erosion, and collecting (CNDDB 2005).

Status with Respect to Recovery

The CNPS list code for Mount Diablo fairy-lantern is 1B.2, meaning that it occurs in a relatively small number of populations in a very restricted area and is endangered in portions of its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable.

Environmental Baseline and Status within the Action Area

Twelve occurrences of Mount Diablo fairy-lantern are found within the action area, 11 of which are on public lands. At least five of the occurrences are either in Mount Diablo State Park or EBRPD lands. The status in the action area is unknown, but is probably stable.

RECURVED LARKSPUR

A detailed description of recurved larkspur and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Historically, recurved larkspur was widely distributed in California's Great Valley, ranging from Butte County to Kern County. Most of the known occurrences are in Kern, Tulare, and San Luis

Obispo Counties. The species now appears to be very rare outside the southern San Joaquin Valley (CNDDB 2005). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Recurved larkspur occurs on sandy or clay alkaline soils, generally in annual grasslands or in association with saltbush scrub or valley sink scrub habitats, ranging in elevation from 100 to 2,000 feet above sea level (CNDDB 2005).

Species-Habitat Model

Modeled habitat is assumed to be all alkali grassland within the action area (i.e., on soils of the Pescadero or Solano soil series [Soil Conservation Service 1977]). Figure 2 in Appendix D of the HCP/NCCP shows the modeled recurved larkspur habitat in the action area. All modeled habitat occurs within the alkali grassland in the southeast and central portion of the action area. There are 2,322 acres of modeled habitat in the action area.

Life History

Recurved larkspur is perennial. It generally blooms between March and May (CNPS 2005).

Reasons for Decline and Threats to Survival

The principal threat to recurved larkspur has been the historic conversion of much of the alkali habitat of the Great Valley to agriculture. At present, the primary threat to recurved larkspur is overgrazing. Other threats include road and utility line construction and competition from invasive nonative plants (CNDDB 2005.)

Status with Respect to Recovery

The CNPS list code for recurved larkspur is 1B.2, meaning that the species is known from only a limited number of occurrences and is endangered in a portion of its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

Four occurrences are reported from the action area, three of which are on private land southeast of Byron (CNDDB 2005). The status in the action area is unknown, but is probably stable or declining.

ROUND-LEAVED FILAREE

A detailed description of round-leaved filaree and its distribution, ecology, and threats can be found in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Round-leaved filaree ranges from southern Oregon through California into northern Mexico (Gillespie 2003). In California, it is known from scattered occurrences in the Great Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges (Taylor 1993; CNDDB 2005). Most of the populations occur in California: one historic collection is recorded from southern Oregon, and three historic collections are recorded from Baja California (Gillespie 2003). Most of the recently documented occurrences are in the interior foothills of the South Coast Ranges (Gillespie 2003). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Round-leaved filaree occurs in grasslands and woodlands on friable clay soils (California Native Plant Society 2005, CNDDB 2005, although it may historically have been common on other soil types (Gillespie 2003). It has been found in nonnative grassland on clay soils with relatively low cover of annual grasses (Jones & Stokes 2002, 2003). It most often occurs in foothill locations at elevations between 200 and 2,000 feet, but is has been collected from locations as low as 30 feet and as high as 4,000 feet.

Species-Habitat Model

Primary habitat is assumed to be nonnative grassland between 200 and 2,000 feet on clay or clay loam soils. Secondary habitat is assumed to be all other nonnative grassland below 4,000 feet on clay or clay loam soils. Clay or clay loam soils were defined as those soils described in the Contra Costa soil survey as having a clay or clay loam component in the upper 16 inches of the soil profile. (Soil Conservation Service 1977.) Figure 2 in Appendix D of the HCP/NCCP shows the modeled round-leaved filaree habitat in the action area. There are 11,250 acres of modeled primary habitat and 4,772 acres of modeled secondary habitat in the action area.

Life History and Reproductive Ecology

The plants bloom between March and May (CNPS 2005), producing small (1 cm) white flowers. The flowers are self-pollinating (Gillespie 2003).

Reasons for Decline and Threats to Survival

Round-leaved filaree is presumed to be declining in southern California due to loss of its friable clay microhabitat (Reiser 1994). Because information about the species is so limited, no specific threats have been documented, although urbanization and competition from nonnative species are cited as threats (CNPS 2005; Gillespie and Allen 2004). Other potential threats include recreation activities, grazing, illegal dumping, and erosion (CNDDB 2005; Gillespie 2003). Because most populations are small (<1,000 plants), the populations are vulnerable to natural events (e.g., drought) as well as human disturbances, both of which reduce the number of seeds produced.

Status with Respect to Recovery

The CNPS list code for round-leaved filaree is 1B.1, meaning that the species occurs in only a few highly restricted populations and is endangered throughout its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

Eight occurrences of round-leaved filaree are listed within the action area, in the Mount Diablo foothills south of Antioch. Six of the occurrences are only known from collections made in or before 1941; at least one of these may be extirpated (CNDDB 2005). One of the occurrences is known to be on public lands, in the EDMRP.. The status in the action area is unknown, but is probably stable or declining.

DIABLO HELIANTHELLA

A detailed description of Diablo helianthella and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Diablo helianthella is endemic to the San Francisco Bay Area, occurring in the Diablo Range, Berkeley Hills, and San Bruno Mountain (CNDDB 2005). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Diablo helianthella associated with thin, rocky, well-drained soils. It is found in grassy openings in woodlands, chaparral, and coastal scrub, often at the transition zone between woodland and chaparral in partial shade (CNDDB 2005). It most often occurs at elevations below 2,400 feet but it has been collected from locations as high as 3,800 feet.

Species-Habitat Model

Modeled habitat is assumed to be oak savannah, oak woodland, chaparral/scrub above 650 feet. Figure 2 in Appendix D of the HCP/NCCP shows the modeled Diablo helianthella habitat in the action area. This model likely overestimates the extent of modeled habitat for this species because the model does not limit modeled habitat to north-facing slopes. There are 28,126 acres of modeled habitat in the action area.

Life History

Diablo helianthella is a perennial herb that blooms from April through June (CNPS 2005).

Reasons for Decline and Threats to Survival

Many of the occurrences of this species on park lands are subject to impacts from recreation and associated activities, such as trail construction and maintenance, road maintenance, brush-clearing, and off-trail travel (CNDDB 2005). Diablo helianthella grows in openings in chaparral and at chaparral margins; because chaparral species can invade these open areas in the absence of fire, fire suppression may lead to the loss of modeled habitat (CNPS 2005). Other threats include urban development, road and utility line construction, grazing, and competition from invasive nonnative plants (CNDDB 2005). Grazing and other ground-disturbing activities can also lead to erosion in habitat areas.

Status with Respect to Recovery

The CNPS list code for Diablo helianthella is 1B.2, meaning that the species is known from only a limited number of occurrences and is endangered in a portion of its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable.

Environmental Baseline and Status within the Action Area

Thirty occurrences are reported from the action area: 28 in Mount Diablo State Park, Los Vaqueros Watershed, EBRPD lands; and two on private land. The status in the action area is unknown, but is probably stable.

BREWER'S DWARF FLAX

A detailed description of Brewer's dwarf flax and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Brewer's dwarf flax is endemic to California, where it is restricted to the Mount Diablo and adjacent foothills in the east San Francisco Bay Area and to the Vaca Mountains of the southern interior North Coast Ranges (Hickman 1993; CNDDB 2005). It occurs below 2,900 feet above sea level. A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Brewer's dwarf flax grows on rocky soils on serpentine, sandstone, or volcanic substrates. It is associated with grassland, oak woodland, and chaparral communities. It typically appears in areas with low vegetative cover, such as the transition zone between grassland and chaparral or open areas in chaparral.

Species-Habitat Model

Modeled habitat is assumed to be oak woodland and chaparral/scrub and a 500 feet buffer into annual grasslands. Figure 2 in Appendix D of the HCP/NCCP shows the modeled Brewer's dwarf flax habitat in the action area. There are 41,178 acres of modeled habitat in the action area.

Life History

Brewer's dwarf flax is an annual herb that blooms from May through July (CNPS 2005).

Reasons for Decline and Threats to Survival

Brewer's dwarf flax generally occurs on public lands with few identifiable threats. Populations adjacent to trails may be subject to foot traffic or trail maintenance, while those on private land are threatened by development (CNDDB 2005).

Status with Respect to Recovery

The CNPS List code for Brewer's dwarf flax is 1B.2, meaning that the species is known from only a limited number of occurrences and is reported to be endangered in a portion of its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable.

Environmental Baseline and Status within the Action Area

Twenty occurrences of Brewer's dwarf flax occur within the action area. Two of the occurrences are in Mount Diablo State Park, two in EBRPD lands, and fourteen within the Los Vaqueros Watershed. One occurrence in Antioch is historic; this population has been extirpated. The status in the action area is unknown, but is probably stable.

SHOWY MADIA

A detailed description of showy madia and its distribution, ecology, and threats can be found in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Showy madia is known from scattered populations in the interior foothills of the South Coast Ranges found between 80 and 3,700 feet elevation (Hickman 1993; CNDDB 2005). A range map of the species in California is found in Appendix D of the HCP/NCCP.

Essential Habitat Components

Showy madia grows in grasslands, chenopod scrub, and oak woodlands on heavy clay soils (CNDDB 2005). A species habitat model was not created for showy madia.

Life History

Showy madia is an annual herb that blooms from March to May (CNPS 2005).

Reasons for Decline and Threats to Survival

General threats reported for showy madia include grazing, road maintenance, off-road vehicle traffic, and competition from nonnative invasive plant (CNPS 2005; CNDDB 2005).

Status with Respect to Recovery

The CNPS list code for showy madia is 1B.1, meaning that the species occurs in a relatively small number of populations and is endangered throughout its range (California Native Plant Society 2005). The statewide status of the species is unknown.

Environmental Baseline and Status within the Action Area

Showy madia has been collected historically near Antioch and between Antioch and Lone Tree Valley (CNDDB 2005). The last observation of this species in Contra Costa County was in 1941 (CNDDB 2005). The status in the action area is unknown.

ADOBE NAVARETTIA

A detailed description of adobe navarettia and its distribution, ecology, and threats is in Appendix D of the HCP/NCCP. Below is a summary of this information.

Historical and Current Distribution

Adobe navarretia is reported to occur in the Sierra Nevada foothills, the Central Valley, and the inner South Coast Ranges, between 325 and 3,300 feet elevation (Hickman 1993). A range map of the species in California is in Appendix D of the HCP/NCCP.

Essential Habitat Components

Adobe navarretia occurs in heavy clay soils of vernal pools and other low, seasonally moist areas in grasslands (Hickman 1993). Adobe navarretia appears to be restricted to areas with a vernally moist, summer-dry hydrologic regime. A species habitat model was not created for adobe navarretia.

Life History

Adobe navarretia is an annual herb that blooms in April and May (Munz 1959).

Reasons for Decline and Threats to Survival

Specific threats to adobe navarretia are not known, although general threats to the species would be similar to those for other vernal pool species, including habitat conversion and competition from non-native plants.

Status with Respect to Recovery

The East Bay chapter of CNPS conservation ranking for adobe navarretia is A2, meaning that the species is currently known from few areas of Alameda and Contra Costa Counties and the species' habitat (vernal pools) is limited and threatened (Lake 2004). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

Five occurrences of adobe navarretia have been documented in the action area since 1987 (CalFlora 2005; Lake 2004). These occurrences are located in Cowell Ranch, Horse Valley, Sand Creek, Byron Hot Springs, and the Los Vaqueros watershed. Two of these occurrences (Cowell Ranch and Los Vaqueros Watershed) are on public lands (Contra Costa Water District and EBRPD). The status in the action area is unknown, but is probably stable or declining.

CONTRA COSTA GOLDFIELDS

On June 18, 1997, the final rule to list the Contra Costa Goldfields as endangered was published (62 FR 33029). Critical habitat was designed on February 10, 2006 (70 FR 46924). Please refer to the final rule and the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005) for more detailed information on its distribution, ecology, and threats on this species.

Description

Contra Costa goldfields is a showy, spring annual herb with feather-like leaves. It produces yellow flowers between March and June.

Historical and Current Distribution

Historically, the species extended from the North Coast south to Santa Barbara, with most populations in the Central Valley (Ramp *et al.* 2003; Hickman 1993; Ramp and Ranker 2002). Currently, the species is known from Napa, Contra Costa, Alameda, Mendocino, Monterey, Sonoma, Marin, and Solano counties (CNDDB 2005).

Essential Habitat Components

Contra Costa goldfields grow in fresh and subsaline vernal pools within open grassy areas in woodlands and valley grasslands from sea level to 1,500 feet (CNDDB 2005). The species generally occurs below elevations of 700 feet (Ornduff 1976). A species habitat model was not created for Contra Costa goldfields.

Reproductive Ecology

Contra Costa goldfields is a self-incompatible species, requiring pollination to produce viable seed (Ramp and Ranker 2002). Pollinators include bees in the genera *Andrenidae* and *Sciaridae* (Ramp 2004).

Reasons for Decline and Threats to Survival

Contra Costa goldfields is threatened by agricultural land conversion, urbanization, creek channelization, and competition from non-native plants (CNPS 2005).

Status with Respect to Recovery

Its CNPS list code is 1B.1, meaning that the species occurs in a very small number of populations and is endangered throughout its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining.

Environmental Baseline and Status within the Action Area

One occurrence of Contra Costa goldfields was reported in 1884 in the Byron Hot Springs area within the action area. Surveys of portions of this area in 1987 and 1988 did not identify any occurrences of this species, but the occurrence is presumed extant (CNDDB 2005). The Service designated 3,406 acres in the action area as critical habitat for Contra Costa goldfields in and around Bryon Hot Springs and the Byron Airport (Unit 7; 68 FR 46683-46732). The status in the action area is unknown.

LARGE-FLOWERED FIDDLENECK

The large-flowered fiddleneck was listed as endangered on May 8, 1985 (50FR19374). Critical habitat was designated in San Joaquin County on May 8, 1985 (50FR17.96). Please refer to the Large-flowered Fiddleneck (*Amsinckia grandiflora*) Recovery Plan (Service 1997) for more detailed information on its distribution, ecology, and threats on this species. Below is a summary of this information.

Description

Large-flowered fiddleneck is an annual herb that grows up to 50 cm tall and produces bright orange flowers (14–20 mm long) from April to May.

Historical and Current Distribution

The species was historically found in the Mt Diablo foothills in eastern Alameda, eastern Contra Costa, and western San Joaquin Counties (CNDDB 2005). All three known occurrences in Contra Costa County have been extirpated. There are only two known natural populations, one on land owned by Lawrence Livermore National Labs and one on private land in San Joaquin County.

Essential Habitat Components

Large-flowered fiddleneck is found on mesic, north-facing, open, grassy slopes in annual grasslands and woodlands between 700 and 1,700 feet (CNDDB 2005). No species habitat model was created for large-flowered fiddleneck.

Reproductive Ecology

Populations of large-flowered fiddleneck have low reproductive output, usually less than 20 nutlets per plant, compared to 200–300 by other species of *Amsinckia*. The species has an outbreeding mating system with a potential for high levels of heterozygosity and genetic recombination, as indicated by its heterostyly and cryptic self-incompatibility (Pavlik et al. 1993).

Reasons for Decline and Threats to Survival

This species is threatened by competition from non-native grasses and grazing (CNDDB 2005).

Status with Respect to Recovery

Its CNPS list code is 1B.1, meaning that the species occurs in a very small number of populations and is endangered throughout its range (CNPS 2007). The statewide status of the species is unknown, but is probably stable or declining. Five populations of the species have been experimentally reintroduced, two in BDMRP in Contra Costa County, one on the Los Vaqueros Watershed in Contra Costa County, and one each on Corral Hollow and Connolly Ranch in San Joaquin County.

Environmental Baseline and Status within the Action Area

No natural populations are found in the action area. Two reintroduced occurrences of large-flowered fiddleneck are documented in the BDMRP within the action area (CNDDB 2005). One reintroduced population occurs in the Los Vaqueros Watershed.

EFFECTS OF THE PROPOSED ACTION

Because many of the effects resulting from Covered Activities may apply to more than one Covered Species, the effects are described below are discussed generally and subsequently to effects on specific taxa.

URBANIZATION

FRAGMENTATION

A primary effect of urban development is fragmentation of natural landscapes. Habitat fragmentation can result in a variety of negative effects to species' population. Effects of fragmentation decrease the number of resident bird species, decrease the diversity of small rodents, and decrease the diversity and cover of native plant species (Soule, *et al.*1988; Bolger *et al.* 1991; Alberts *et al.* 1993; Bolger *et al.* 1977).

Fragmentation can result in landscapes with many small habitat patches rather than few large patches. Small habitat patches tend to have altered species composition, reduced community diversity, and smaller population sizes for individual species. Species with greater susceptibility to the effects of reduced habitat patch size are more likely to be extirpated from these small patches. Reduced community diversity and altered species composition can change natural ecological functions, which can result in unpredictable effects given the complexity of community dynamics. Small populations are more susceptible to extirpation due to random fluctuations in population dynamics or catastrophic events (Ewens *et al.* 1987; Shaffer 1987). Small habitat patches also have high perimeter to area ratios, which increases edge effects that can result in even small populations. If small populations are isolated from nearby populations, they may be susceptible to deleterious genetic effects of inbreeding depression (Lande and Barrowclough 1987), and extirpated populations may not be replaced by dispersing individuals from other populations (Gilpin 1987).

Fragmentation studies by Soule et al (1988) and Crooks and Soule (1999) concluded that the decline of top predators in fragmented landscapes could lead to the release of smaller predators that, in turn, strongly limit populations of prey species. This phenomenon, known as mesopredator release, has been implicated in the decline and extinction of prey species worldwide (Willis and Eisenmann 1979); Matthaie and Sterns 1981; Whitcomb *et al.* 1981; Wilcove *et al.* 1986; Soule *et al.* 1988; Terborgh 1988; Sovoda *et al.* 19995; Crooks and Soule 1999; Haas and Crooks 1999). Parks and Harcourt (2002) found that preserves adjacent to high-density development had significantly more extinctions of large mammals. Mesopredator release may be facilitated through predator control programs. Human populations in close proximity to top predators can lead to the lethal removal of individual animals because of real or perceived threats to humans.

Effects of habitat fragmentation can be minimized by maintaining linkages (Soule 1986; Saunders *et al.* 1991; Beirer and Noss 1999). Linkages are connections between larger blocks of habitat that allow for wildlife movement, recruitment, and colonization between different core biological areas. Linkages are important for allowing species to move or disperse from their natal areas to sites where they may reproduce. Linkages that provide for successful movement between core population areas reduce genetic isolation and allow for recruitment into areas where populations have been extirpated due to natural or anthropogenic disturbances or

stochastic events (Soule and Simberloff 1986; Lande 1988). Several factors influence the effectiveness of habitat linkages including length, width, and species targeted for use (Meffe and Carrol 1998). When large blocks of habitat remain intact, the rate of successful dispersal between core population areas is higher. At a minimum, dispersal habitat within linkages should provide some level of foraging and limited protection from predators. When the distance between core populations of a species is greater than the dispersal distance for individuals, effective linkages must provide live-in habitat. It is important to recognize that the effectiveness of any habitat linkage varies considerably by species. Linkages are critical to the design and function of any conservation area.

EDGE EFFECTS

Deleterious effects of conversion of natural habitats to other uses often extend beyond project footprints resulting in "edge effects." The biological integrity of habitats adjoining development can be diminished by adverse effects of noise, lighting, exotic plant and animal introduction, predators, parasitism, disturbance from human activities, changes in fire regimes, and other factors. The severity of these effects depends on distance to land alteration boundaries, source of disturbance, and the affected species. Species that are particularly vulnerable to edge effects, known as interior species, require large patches of habitat that are relatively free from edge effects.

Land uses adjacent to habitat areas may introduce noise and artificial lighting that are likely to affect wildlife species. The impact of noise on wildlife is likely to differ from species to species and is not only dependent on the decibel level of the noise, but also on the duration and frequency. For example, birds rely on auditory signals in the form of songs, and alarm or scolding calls, to establish and defend territories, attract a mate, feed and care for young at the nest, and to locate and evade a potential predator. Noise may alter these time-consuming and energetically expensive behaviors of birds. Increased noise levels have the potential to lower reproductive fitness by affecting territorial defense, mate acquisition, the ability to detect conspecific encroachments, foraging, and predator avoidance. Noise may also be detrimental to birds by causing nest neglect or abandonment due to startle effects, cause sleep interference, or otherwise elicit physiological responses or annoyance that have energetic costs (Ward and Stehn 1989). Construction and the use of heavy equipment can result in noise and vibration impacts that are thought to be potentially harmful to a variety of bird species (Gunn and Livingston 1974; RECON 1989; Pike and Hays 1992).

Non-native species invasion and increased predation are important consequences of urbanized edge and natural areas. Habitat edges are particularly vulnerable to introduction of non-native species. Invasion by non-native plant species may alter microhabitats and disrupt natural ecological processes that in turn may negatively affect native animal and plant species. Numerous urban adaptive species such as opossums, raccoons, skunk, ground squirrels, and various corvids thrive on edges by making use of additional food and water sources provided by residential and golf course development adjacent to habitat areas. Brood parasitism by brown-

headed cowbirds, which can lower the reproductive success of native avian species, is likely to be exacerbated by urban development, by providing foraging habitat for this species.

Irrigation practices may contribute to overall wetter soil conditions thereby creating more favorable soil condition for invasive any species such as the Argentine ant, which are known to be abundance in landscaped areas and invade habitat edges (Suarez *et al.* 1998). Argentine anta can pose a predation threat to the young of low lying avian nests. In addition, Argentine ants can alter the native arthropod community, there by significantly reducing their diversity and abundance (Bolger *et al.* 2000). A reduction in the native arthropod community may result in reduced food resources for arthropod predators.

Undeveloped lands adjacent to developed areas can provide convenient access to natural areas. The use of off-road vehicles within Preserve Systems or other natural lands could result in habitat destruction and degradations (*e.g.* soil compaction, soil erosion, increase fire potential, increased opportunities for non-native species introduction, and increase access opportunities by creating more trails). Where development occurs adjacent to habitat, domestic pets, including cats, can intrude into natural areas and opportunistically prey on avian and small mammals species. Since domestic cats have been documented to range up to 3,100 feet from their home (Barratt 1997) an increased risk of predation to species may result from development in proximity to Preserve System lands.

ROADS

Although the HCP/NCCP identifies road maintenance, road widening and new road construction as proposed Covered Activities, in some cases the exact road alignment is not known. Therefore, depending on the exact location of the roads in relationship to the Preserve System assembly, there is the potential to increase the degree of fragmentation of Preserve System lands, depending on the location, nature, and design features of the proposed new or improved roads.

New Roadways

Placement of roadway within the natural landscape can cause direct loss of habitat and individuals, alter quality of adjacent habitats, disrupt hydrologic regimes, cause road kills, and fragment habitat. This can result in the decline of certain species populations (particularly smaller populations that can be more susceptible to genetic isolation and local extinction), a loss of species diversity near new roadways, and impede animal movements.

The direct effects associated with new roadway construction are the permanent loss of habitat and direct mortality of individuals. Temporary impacts to habitat is also likely to occur during actual construction in conjunction with such activities as land contouring, construction staging and vehicle access, increased noise and dust generation, and possible introduction of night lighting if construction is not limited to the dawn to dusk hours of daylight.

The habitat altering effects of new road construction include the creation of new microclimates and changes in other physical conditions extending beyond the road's edge, increases of exotic plant species, and direct mortality and/or relocation of plants and animals from the area of the road because of habitat loss and/or physical disturbance (Spellerberg 1998). In general, the effects of roads on wildlife can extend beyond the road edge into an area described as the "road effect zone" (Forman *et al.* 1997). The road effect zone is the area from the road edge to some outer limit within which road traffic has significant ecological effects on wildlife. The width of the road effect zone is based on traffic intensity, the number of lanes in the roadway, the species present along the roadway, and a variety of ecological variables. Changes in traffic intensity can alter the effect of roads and the width of the road effect zone. The threshold where the distance of the road effect zone ends varies for each species (Forman and Deblinger 1998).

The effects of roads on the physical environment include noise, light, dust, and other particulates, metals such as lead, cadmium, nickel, and zinc, and gases such as carbon monoxide and nitrogen-oxygen complexes (NO_x). Heavy metals are known to accumulate in the tissues of plants and animals up to 200 meters away from road (Trombulak and Frissel 2000). Noise and artificial lighting have been shown to affect some wildlife species given that many species rely on sight or sound to communicate, navigate, avoid danger, and find food. Car traffic has been correlated with a reduction in the density of breeding bird populations adjacent to roads (Reijnen *et al.* 1995 in Spellerberg 1998). Reijnen et al (1995) documented a reduced ability of male willow warblers close to highways to attract and keep mates, possibility due to the distortion of the song by traffic noise. The effects of road and traffic lighting on plants and animals appear to be wide ranging (Spellerberg 1998).

Dust effects that have been documented primarily on plants, include physical effects such as cell destruction and blocked stomata that can lead to reduced photosynthesis, respiration, and transpiration. In addition to dust, other road pollutants may cause physiological stress in some plants, making them more susceptible to pest attack, as has been shown by aphid infestations in roadside trees (Braun and Fluckiger 1984 in Spellerberg 1998).

Roadways that cross or parallel watercourses or drainage areas cause changes to hydrology and water quality by changing the stream channel and floodplain constrictions and increasing runoff from impervious road surfaces. Road construction can alter hydrological processes in a number of ways including velocity and flow direction. Shifts in velocity can result in increased scour, headcutting, and downstream sedimentation. Changes to hydrology from either redirecting flows or creating wet habitat where none previously existed can alter species' habitats. Vehicles emit potential contaminants onto roadways through tire wear; fluid leaks, brake lining wear, rust, and exhaust that are transported through water flow (Forman *et al.* 2002). A review of toxic substances introduced into flowing water from roadways indicated that although a wide range of pollutants could be described, species response were variable depending upon life form (plant or animal) and life-stage such that few generalizations can be made (Hellawell 1998 in Spellerberg).

Where roads bisect or abut areas with wildlife, mortality due to vehicular collisions is likely to occur. Vehicle speed, traffic volume, and the juxtaposition of the roadway in relation to habitat

cover and movement corridors influence the rate of wildlife collisions (Forman *et al.* 200). Some species are attracted to roads and roadsides for thermoregulation and are more vulnerable to traffic morality and predation. Other species are attracted to roadways to scavenge road kills, thereby increasing the risk of morality from vehicle collisions. Few comparative data are available regarding the significance of road mortality measured against the relative importance of natural sources of mortality such as predation (Forman *et al.* 2000). However, based on studies conducted to date, road mortality is known to have significant effects on frogs and toads (Faring *et al.* 1995), and snakes (Bernardino and Dalrymple 1992; Rosen and Lowe 1994). Wide-ranging carnivores appear to be especially susceptible to road mortality. Vehicle collisions are likely the greatest source of mortality for Florida panther (Maehr *et al.* 1991) and mountain lions in the San Ana Mountains in southern California (Beier and Barrett 1991). Although the long-term effects on population dynamics of affected species is lacking, road kill seems to have the most detrimental effect on species with small or diminishing populations (Spellerberg 1998).

Road Improvement Projects

Where roadways are widened or otherwise modified, direct effects similar to those described above for new roadways are likely to occur in areas beyond the existing roadbed. The incremental effects from road widening are dependent on the degree of the widening from the existing facility, changes in the level of use, and upgrades (*e.g.* dirt to paved, introduction of a median barrier) as well as the individual species movement patterns and ability to cross roads. Roadway improvements often provide for increased capacity and/or function resulting in increased volume, speed, and potentially total use time. The percentage of individual animals killed on roadways has been reported to increase with the width of the road and number of vehicle trips (Carr and Fahrig 2001 in Longcore and Rich 2001). Forman *et al.* (2000) also reported that road mortality has been significantly correlated with vehicle speed. Depending upon a species' ability to move about and migration needs, widening roadways from as little as two to four lanes can sever population connections between habitats (Longcore and Rich 2001), thereby contributing incrementally to habitat fragmentation and possible species decline.

General Effects from Roads on Specific Taxa

1. Amphibians and Reptiles

In general, amphibians and reptiles have highly restricted home ranges and frequently follow genetically controlled migratory paths. They are, therefore, more susceptible to mortality and effects of habitat fragmentation, and local or restricted populations may become rare (Jackson 1996 in Forman and Deblinger 1998).

Amphibians are likely to be vulnerable to the effects of roadways through changes to hydrology and water quality. Ponds that amphibians rely on may fill in because of increased sedimentation. Significant sedimentation may also change streambed characteristics by increasing overall silt content of the bed and potentially suffocating aquatic organisms, including previously deposited eggs. Many amphibians also require both aquatic and terrestrial habitats for different parts of

their life history cycles. Narrow, linear disruptions next to streams can result in barriers or increased risk of mortality as species move between upland and aquatic habitats. Amphibians with moist skin have highly permeable skin and are especially sensitive and vulnerable to pollutants (Hayes *et al.* 2002). Temporary pools of water created by road runoff may attract amphibians to breed there, but juvenile survivorship and recruitment maybe low due to the chemical and/or temporary nature of the pond, increased risk of road kill, frequent disturbances, and road-related pollution and contaminants. Therefore, changes to natural hydrology caused by new road or road improvements can severely disrupt breeding and migratory capability and therefore overall fitness in amphibians. In addition, many amphibian species are highly sensitive to light; changes in the light regime may prohibit some species from foraging altogether leading to the extirpation from and area (Buchanan 1993; Jaeger and Hailman 1976 in Longcore and Rich 2001).

Reptilian species such as snakes are often attracted to the heat stored in asphalt roads and shoulders for thermal regulation thereby increasing their susceptibility to road mortality and predation. Roads are known to be a significant source of mortality in both Florida and Arizona (Bernardino and Dalrymple 1992; Rosen and Lowe 1994). General principles apply in that road-related mortality and habitat fragmentation will have great effects on rare or already restricted, threatened or endangered species and to those that are long-lived and have low reproductive rates than on common, more wide-ranging species.

2. Birds

Edge effects associated with roads include increased light and noise, which can disrupt breeding and foraging behavior and communication necessary to successful mating (Reijnen *et al.* 1997; Bergen and Abs 1997 in Longcore and Rich 2001). The detrimental effects of road noise have been recorded for wetland avian species. A zone of significantly decreased density of birds extending from the roadway was measured to be from 500-600 meters for rural road and 1600-1800 meters for highways (van der Zande *et al.* in Longcore and Rich 2001).

New roadway construction and/or the widening of existing roads may prevent movement across roadways or increase mortality of individuals attempting to cross (Forman and Godron 1986; Forman and Alexander 1998; Forman *et al.* 2003). The introduction of traffic or a significant increase in ambient traffic noise, volume, and speed associated with road widening may also disrupt bird communication that for some species is a significant factor in pair establishment (Longcore and Rich 2001).

3. Mammals

The introduction of new roadways or an increase in traffic volume and speed as a result of road improvements increases barriers to dispersal for mammals (Forman *et al.* 2003). Apart from increased risk of mortality associated with new or expanded roadways, barriers to movement may create genetically isolated subgroups within populations (Baker 1998). If the subgroups are sufficiently small and restricted, potentially deleterious population genetic effects such as inbreeding can occur (Allendorf and Leary 1986). In addition, artificial light introduced by

roadways and associated traffic may inhibit foraging and mating behaviors of nocturnal species and increase the risk of predation. The presence of road kill attracts various predator species such as hawks, owls, and eagles that are known to hunt rodents and small mammals along roadside areas

SPECIES SPECIFIC EFFECTS

Implementation of the covered activities will result in take of some Covered Species. For most species, incidental take has been quantified on the basis of habitat loss assumed suitable for each species (see Table 3-9 in the HCP/NCCP for habitat associations of the Covered Species). Estimates of incidental take are based on species-habitat models developed for 20 of the 28 Covered Species. Species-habitat models may overestimate the actual extent of modeled habitat because they were developed with conservative assumptions, do not distinguish between habitat quality, and in some cases rely on limited occurrence data for model verification. In addition, not all modeled habitat is occupied by the subject species. The species profiles in Appendix D in the HCP/NCCP provide details on each model and their limitations. For eight of the Covered Species, sufficient information was not available to create habitat models. In these cases, worst-case assumptions were used regarding the amount of modeled habitat removed by covered activities. The effects on each Covered Species of the issuance of the proposed ITP to the Applicants are analyzed below.

DIRECT AND INDIRECT EFFECTS

Direct effects are the immediate effects of the proposed project on the species or its habitat and include the effects of interrelated actions and interdependent actions. Interrelated actions are those actions that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those actions that have no independent utility apart from the proposed action (50 CFR 402.02). Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02).

Townsend's Western Big-eared bat

Because of lack of data, a GIS-based habitat model was not developed for this species. Few recent sightings of the bat have been reported, and there are no published records of Townsend's western big-eared bats within Contra Costa County. However, the species likely roosts in the action area in suitable abandoned mines, abandoned buildings, and caves, and forages widely throughout the action area in a variety of land-cover types.

Direct Effects to Roosting Habitat

At least two mines exist in the action area (BDRMP and mines within Antioch adjacent to BDMRP), but it is unknown if Townsend's western big-eared bats occur in them. However, other bat species are known to utilize bat boxes installed within mines located in BDMRP (S. Bobzien pers. comm.). Covered activities are not anticipated to directly affect these habitat features. However, if abandoned mines are incorporated into the Preserve System, mine stabilization may be needed for safety; stabilization measures may result in harassment of Townsend's western big-eared bat if this species occupies those sites. Similarly, stabilization of old buildings in the Preserve System occupied by bats may result in direct or indirect impacts to this species by disturbing roost sites.

Direct Effects to Foraging Habitat

Although habitat for this species was not modeled, the loss of up to 4,152acres (12%) of annual grassland and 162 acres (24%) of wetlands and wetland complexes would reduce available foraging and watering habitat for this species.

Indirect Effects

Indirect impacts such as increased harassment or disturbance due to overall human population growth or recreation within the Preserves, may affect individual bats that roost in buildings, bridges, or other structures within the action area (see Table 4-1 in the HCP/NCCP). The introduction of new roadways and increased urbanization create artificial light that may change foraging behavior of bats or expose bats to increased predation. In addition, some of the preserve land parcels may contain wind turbines. Because covered activities will remove foraging habitat free of wind turbines, there may be an indirect effect of increase wind-turbine strikes on bats.

Discussion

The HCP/NCCP is expected to have a net benefit to the species by locating and protecting roost sites. Issuance of the ITP will affect up to 4,152 acres of annual grassland that Townsend's western big-eared bat may use for foraging. The loss of this potential foraging habitat represents only 12% of the available foraging habitat in the action area. Wind turbine leases acquired within the Preserve System in Zone 5 will be retired when feasible to reduce injury and mortality of bats resulting from turbine strikes. Planning and preconstruction surveys are required in areas with suitable roosting habitat. If occupied sites are identified, seasonal restrictions on construction are required (see Section 6.3.3 of the HCP/NCCP for additional detail). This species will be covered by the HCP/NCCP because roosting sites (caves, abandoned buildings, and abandoned mines) will be protected and an estimated 40–54% of suitable foraging habitat outside existing parks and open space will be conserved. The conservation measures provided under the Plan should provide for the continued viability of the bat in the action area.

San Joaquin Kit Fox

As described in the species account, core habitat for San Joaquin kit fox is defined as annual grassland, alkali grassland, and oak savanna contiguous with grassland. Secondary foraging habitat occurs in agricultural fields and row crops. Because habitat fragmentation is a significant threat to kit fox, preservation of contiguous habitat is of primary importance. Ideally, contiguous habitat would be preserved that will serve both as local foraging and breeding habitat (i.e., support one or more kit fox home ranges) and wide enough (0.25-mile) as regional movement habitat. Although a wider corridor would be optimal, corridor width is restricted due to topography. The action area represents the northernmost extension of the species' range, so maintaining connectivity to Alameda County to the south is critical to maintaining the species in the action area. Within the action area, four major movement routes, trending northwest-southeast, are believed to link known occurrences in BDMRP to the portions of its range in southern Contra Costa County (see Figure 5-5 in Chapter 5 of the HCP/NCCP and further discussion in Chapter 5).

Direct Effects

The southward expansion of Pittsburg and Brentwood would affect small portions of modeled core habitat for kit fox, while growth of Byron and infill in Brentwood would affect small portions of habitat defined as low use in the model. The expansion of the Byron Airport would affect modeled core habitat for this species. The westward expansion of Pittsburg would affect areas modeled as core habitat for kit fox, but this area may be outside the species' current range. However, kit foxes may be forced into less desirable habitat (which was not considered in the model) that is steeper, has less burrow availability due to hard soil, or has a higher predator concentration. Overall, up to 4,576 acres of core kit fox habitat may be affected by covered activities under the MUDA.

Indirect Effects

Indirect effects such as increased noise and lights from urban areas, and harassment from pets have the potential to affect kit fox along the urban-wildland interface. Feral cats increase competition for food and introduce disease. (See Table 4-1 in the HCP/NCCP for a list of potential indirect effects). The Vasco Road Widening project will remove core habitat for kit fox and may reduce kit-fox movement from Alameda County into Contra Costa County by creating a road that is a greater visual barrier than exists currently. The increased width and the number and speed of vehicles increases the likelihood of actual vehicle strikes if a kit fox does try to cross the road. To minimize habitat fragmentation because of the Vasco Road Widening Project, extensive design measures will be required to maintain connectivity for kit fox under the road, including large tunnels, culverts, and viaducts. Monitoring stations will be placed to determine the effectiveness of such measures. The introduction of new roadways or an increase in traffic volume and speed because of road improvements increases barriers to dispersal for mammals. In addition, the presence of road kill attracts various predator species such as kit fox and exposes

them to increased risk of vehicle strike. Increased risk of fire associated with roads (accidents and tossed lighted cigarette butts) may also harm or kill kit foxes and temporarily remove habitat.

Discussion

Kit fox will be affected by impacts to a maximum of 4,576 acres of modeled core habitat that may be removed by covered activities (approximately 11% of all modeled core habitat in the action area). The conservation strategy will protect an estimated 17,164–20,465 acres of suitable core habitat for San Joaquin kit fox in the action area, resulting in an additional 43–51% of lands managed as foraging habitat outside of parks and open space conserved. A network of core preserves and movement routes will protect a critical linkage for San Joaquin kit fox between its range outside Contra Costa County and most past known locations in Contra Costa County. Preserves will link existing open space that supports San Joaquin kit fox to provide a continuous system of protected areas from BDMRP at the northern edge of the species range to the Contra Costa-Alameda County line.

Annual grassland within preserves will be managed to enhance small-mammal populations (a prey base for kit fox) (Conservation Measure 2.5) and to enhance the native plant component of this vegetation community (Conservation Measure 2.4). Development guidelines will ensure that indirect impacts on this species from covered activities that occur adjacent to the preserve system are minimized (Conservation Measures 1.6 and 1.9). Prior to submission of an application for coverage under the HCP/NCCP, planning surveys will identify active breeding habitat or denning sites for kit fox. Preconstruction surveys are required in areas with burrows or dens to identify potentially active dens. Destruction of occupied dens is prohibited. Protocols are in place for avoiding injury to individuals (see Section 6.3.3 of the HCP/NCCP). Because the proposed action is likely to benefit the species in the action area within the Preserves and within existing open space, the viability of the kit fox in the action area will not be compromised.

Tricolored Blackbird

As described in the species account for tricolored blackbird (Appendix D of the HCP/NCCP), core breeding habitat is defined as wetland, pond, and sloughs/channels in grassland, alkali grassland, cropland, pastures, ruderal, urban, and oak savanna land-cover types. Primary foraging habitat is defined as pastures, grassland, seasonal wetlands, and cropland. Secondary foraging habitat occurs in orchards and vineyards.

Direct Effects

Within Contra Costa County, tricolored blackbirds forage and breed in freshwater marshes dominated by cattails or bulrushes or in areas with suitable willow, blackberry, thistle, or nettle habitat. Most core habitat for tricolored blackbird is outside the MUDA (the core habitat along Marsh Creek is expected to remain intact, although it will decline in ecological value because of

increased urban development surrounding it). Approximately 9,825 acres of primary foraging and core habitat for tricolored blackbird may be affected by covered activities under the MUDA.

The potential growth of Oakley into the northeastern portion of the action area and growth within Contra Costa County towards the northwestern portion of the action area would affect primary foraging or breeding habitat for tricolored blackbird. Expansion of Clayton would affect small portions of primary foraging habitat as well. As much as 204 acres of core habitat and 9,621 acres of primary foraging habitat birds would be affected by covered activities under the MUDA (See Table 4-5 of the HCP/NCCP). An additional 1,833 acres of secondary foraging habitat for tricolored blackbird could also be affected by covered activities under the MUDA.

Indirect Effects

The predominant indirect effects on tricolored blackbirds from covered activities are increased harassment from people, vehicle-related disturbance (e.g., to breeding habitat near roads), increased urban predators (cats, skunks, etc.), and increased exposure to humans throughout the action area, including within Preserves. Edge effects associated with roads and urban development include increased light and noise, which can disrupt breeding and foraging behavior and inhibit communication necessary for successful mating. Changes to existing roadbeds, bridges, and/or barriers and guardrails can change sound characteristics in certain habitats; thereby altering ambient conditions for certain birds.

Discussion

Tricolored blackbird will be affected by impacts to a maximum of 204 acres of core habitat and 9,621 acres of primary foraging habitat that may occur as result of covered activities. The Preserve System will protect an estimated 126–164 acres of modeled core habitat and 16,474–20,138 acres of primary foraging habitat within the IUDA and MUDA, respectively. The Preserve System will also protect at least seven of the 13 ponds in Subzone 2c, all of which provide potential breeding habitat for tricolored blackbird. Wetland and pond creation and restoration will provide additional habitat for tricolored blackbird. An estimated 84–85 acres of perennial wetland complexes will be created or restored as well as an estimated 21-22 acres of pond habitat (Tables 5-16 and 5-17 in the HCP/NCCP). Conservation easements will be acquired on 250–400 acres of cropland or pasture in Acquisition Analysis Zone 6. Conservation easements will require landowners to enhance the value of agricultural lands for tricolored blackbird and other Covered Species (Conservation Measures 1.3 and 2.11). Development guidelines will ensure that indirect impacts on this species from covered activities that occur adjacent to preserves are minimized (see Conservation Measures 1.6, 1.9, and 1.10). Covered activities must avoid occupied nests during the breeding season. Because the proposed action will acquire modeled habitat, target habitat restoration for tricolored blackbird, and avoid direct impacts to the species, the viability of tricolored blackbird will not be compromised.

Golden Eagle

Golden eagles forage in nearly all terrestrial natural land-cover types within the action area.

Direct Effects

The potential growth of Oakley into the northeastern portion of the action area and growth within Contra Costa County towards the northwestern portion of the action area would affect primary foraging or breeding habitat for golden eagle. Expansion of Clayton would affect small portions of primary foraging habitat for the species. Up to 13,491 acres of foraging habitat for golden eagle would be affected by covered activities under the MUDA. Some foraging habitat would be affected as the result of infill within the participating cities.

Golden eagles are designated as no-take species by the plan, meaning that individuals and nests cannot be injured or destroyed by covered activities.

Indirect Effects

The predominant indirect effects on covered birds from covered activities are increased harassment from people, increased vehicle-related disturbance (e.g., to breeding habitat near roads), and increased exposure to humans throughout the action area, including within Preserves. In addition, some of the Preserve land parcels may contain wind turbines. Covered activities will remove foraging habitat free of wind turbines, therefore, there may be an indirect effect of increase wind-turbine strikes on golden eagle.

Discussion

Golden eagles will be affected by impacts to a maximum of 13,491 acres of foraging habitat that may occur because of covered activities. The Preserve System will protect an estimated 24,321–29,267 acres of foraging habitat depending on the urban development area. Because of their ability to forage in a wide variety of habitat, nearly the entire Preserve System will provide suitable foraging habitat for golden eagles. New preserves will be linked to existing protected land, which will result in large areas of contiguous foraging habitat for golden eagles. Acquisition of occupied or suitable nest sites will be a priority when assembling the Preserve System (see Conservation Measure 3.3).

Projects covered by the HCP/NCCP must avoid occupied nests during the breeding season to minimize direct impacts on this species. However, few, if any, suitable nest sites occur within the urban development areas. Development guidelines will ensure that indirect impacts on this species from covered activities at the urban-wildland interface are minimized (see Conservation Measures 1.6, 1.9, and 1.10 in the HCP/NCCP). Conservation Measure 1.11 prohibits the take of individual golden eagles due to their status as Fully Protected in the California Fish and Game

Code. Wind turbine leases acquired within the Preserve System in Zone 5 will be retired when feasible to reduce injury and mortality of golden eagles and other raptors. Annual grassland within preserves will be managed to enhance small-mammal populations (a prey base for golden eagles) (Conservation Measure 2.5) and to enhance the native plant component of this vegetation community (Conservation Measure 2.4). Both of these measures are expected to benefit golden eagle. Therefore, the proposed action will acquire and restore grasslands, and other natural land-cover types, increase prey availability, and prohibit direct take of eagles. The viability of golden eagle will not be compromised.

Western Burrowing Owl

All annual grassland, alkali grassland, wind turbine, seasonal wetland, ruderal, and turf land cover types within the action area were considered suitable breeding and foraging habitat for western burrowing owl. All pasture and cropland land cover was considered occasional or limited use areas for western burrowing owl.

Direct Effects

The potential growth of Oakley into the northeastern portion of the action area and growth within Contra Costa County towards the northwestern portion of the action area would affect primary foraging or breeding habitat for burrowing owl. Expansion of Clayton would affect small portions of primary foraging habitat for the species. Up to 5,755 acres of breeding and foraging habitat for burrowing owl would be affected by covered activities under the MUDA. While habitat for western burrowing owl is found throughout the action area, occurrences in the southeast portion of the action near the Byron Airport are best known (Glover pers. comm.). Within that area, expansion of unincorporated portions of the county near Byron and Discovery Bay has the potential to affect known populations and limited-use habitat5. Expansion of the Byron Airport would also affect a known population and its breeding habitat.

Indirect Effects

The predominant indirect effects on burrowing owls are increased harassment from people, increased vehicle-related disturbance (e.g., to breeding habitat near roads), increased vehicle strikes, isolation of individuals on vacant lots, and increased exposure to humans throughout the action area, including within HCP/NCCP preserves. In addition, some of the Preserve land parcels may contain wind turbines. Because covered activities will remove foraging habitat free of wind turbines, burrowing owls that move into grasslands with wind turbines will be at increased risk of being killed or injured from turbine strikes.

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5 *Limited-use habitat* for western burrowing owl is defined in the HCP/NCCP species distribution model as pasture or cropland land-cover types.

Discussion

Burrowing owls will be affected by impacts to a maximum of 5,755 acres breeding and foraging habitat that may occur because of covered activities. The Preserve System will protect 16,675–19,844 acres of breeding and foraging habitat and 345–703 acres of low-use habitat under the IUDA and MUDA, respectively. Breeding and foraging habitat outside will be enhanced (see Conservation Measures 3.4 and 3.5 in the HCP/NCCP). A network of Preserves will protect large blocks of grassland habitat. New linkages will be created suitable for dispersal and colonization throughout the Preserve System and to existing parks and open space (Conservation Measure 1.1). To attract and retain western burrowing owl, artificial burrows and perches will be installed, where appropriate (Conservation Measures 3.4 and 3.5). Wind turbine leases acquired within the Preserve System in Zone 5 will be retired when feasible to reduce injury and mortality of burrowing owls and other raptors. Project approvals require avoidance of occupied burrows during the breeding season. Development guidelines ensure that indirect impacts on this species from covered activities that occur adjacent to preserves are minimized (see Conservation Measures 1.6, 1.9, and 1.10). Planning and preconstruction surveys are required in areas with active western burrowing owl burrows. Destruction of occupied burrows is prohibited (Chapter 6, Section 6.3.3). Because the proposed action will protect and enhance grasslands and other natural land-cover types, acquire agricultural easements, improve habitat quality through conservation measures, and prohibit direct take of the species, the viability of burrowing owl will not be compromised.

Swainson's Hawk

Modeled breeding habitat includes all riparian woodland scrub and non-native woodland land cover types within the action area in or east of Marsh Creek and below 200 feet in elevation. All cropland and pasture, within 10 miles of existing breeding sites or potential breeding habitat were modeled as Swainson's hawk foraging habitat. Annual grassland, alkali grassland, and seasonal wetland land-cover types below 200 feet in elevation were also modeled as foraging habitat.

Direct Effects

The potential growth of Oakley into the northeastern portion of the action area and growth within Contra Costa County towards the northwestern portion of the action area would affect primary foraging or breeding habitat for Swainson's hawk. Expansion of Clayton would affect small portions of primary foraging habitat for the species. Up to 16 acres of breeding habitat and 4,743 acres of foraging habitat would be affected by covered activities under the MUDA.

Indirect Effects

The predominant indirect effects on Swainson's hawk are increased harassment from people, increased vehicle-related disturbance (e.g., to breeding habitat near roads), conversion of agricultural lands that provide foraging habitat to other uses, and increased exposure to humans throughout the action area, including Preserves. Some of the Preserve land parcels may contain wind turbines. Because covered activities will remove foraging habitat free of wind turbines, there may be an indirect effect of increase wind-turbine strikes on Swainson's hawk if they change foraging patterns to include areas with wind turbines.

Discussion

Swainson's hawk will be affected by impacts to a maximum of 16 acres of breeding habitat and 4,743 acres of foraging habitat that may occur as a result of covered activities. The Preserve System will protect at least 12–16 acres of riparian breeding habitat and an estimated 3,614–4,451 acres of foraging habitat. The loss of riparian woodland/scrub, some of which is considered suitable nesting habitat for Swainson's hawk, will be mitigated through in-kind protection of riparian woodland (Tables 5-5a and 5-5b in the HCP/NCCP and Conservation Measure 1.1) at a ratio of 2:1 and enhancement and restoration of riparian woodland/scrub within preserves at a ratio of 1:1 (Tables 5-16 and 5-17 in the HCP/NCCP and Conservation Measures 2.9 and 2.10). An estimated 50–55 acres of riparian woodland/scrub will be restored within the Preserve System (Table 5-17 in the HCP/NCCP), much of which will be suitable breeding habitat for Swainson's hawk. An estimated 250–400 acres of cropland or pasture will be acquired to support Swainson's hawk foraging along Kellogg Creek, Marsh Creek, or adjacent to Dutch Slough. Acquired conservation easements will require landowners to enhance the value of agricultural lands for Swainson's hawk and other Covered Species (Conservation Measures 1.3 and 2.11). Wind turbine leases acquired within the Preserve System in Zone 5 will be retired when feasible to reduce injury and mortality of Swainson's hawk and other raptors.

Extensive areas of cultivated agriculture in the action area provides suitable foraging habitat for Swainson's hawk and will continue to be protected through strict zoning within Contra Costa County's Agricultural Core. There is no plan to change substantially the existing zoning. Project approvals must require avoidance of occupied nests during the breeding season. Development guidelines will ensure that indirect impacts on this species from covered activities that occur adjacent to preserves are minimized (see Conservation Measures 1.6, 1.9, and 1.10). Prior to submission of an application for coverage under the HCP/NCCP, planning surveys will identify potentially active Swainson's hawk nest sites. Preconstruction surveys are required in areas with active nests. Destruction of occupied nests by covered activities is prohibited, and 1,000-foot buffer zones during the nesting season are required. Because the proposed action will protect grassland habitat, restore riparian habitat, acquire conservation easements, increase the prey base for hawks, and avoid direct take of the species, the viability of Swainson's hawk will not be compromised.

Silvery Legless Lizard

The action area is known to provide habitat for silvery legless lizard. Within the action area, known occurrences of silvery legless lizard are restricted to the EBRPD Legless Lizard Preserve located east of the intersection of SR 4 and Big Break Road in Oakley. Modeled habitat for silvery legless lizard is restricted to sandy soils on approximately 3,422 acres of the action area, scattered through the central and southeastern portions.

Direct Effects

Silvery legless lizards will be affected by impacts to a maximum of 298 acres of modeled habitat that may occur because of covered activities.

Indirect Effects

Human activities or impacts that increase as the human population grows can also indirectly affect reptiles within the action area. These effects include light pollution, human disturbance, increased numbers of domestic predators (dogs and cats), change in prey species and abundance due to pesticide use associated with urban development, increased disturbance from off-road vehicles, and increased risk of wildfire.

Discussion

Silvery legless lizards will be affected by impacts to a maximum of 298 acres to modeled habitat that may occur because of covered activities. The Preserve System will protect at least 153–166 acres of modeled habitat under the IUDA and MUDA, respectively. Habitat for silvery legless lizard in Subzones 2a, 2e, and 2h will be preserved if pre-acquisition surveys confirm the suitability predicted by models (Conservation Measure 1.1). Development and refinement of management-oriented conceptual models and species-habitat models will guide future efforts at conservation and management. Restrictions on recreation in protected habitat will minimize disturbance to the species (Conservation Measure 1.5). In addition, pesticide use threatens this species by affecting its insect prey base, and will be controlled in preserves (Conservation Measure 1.2). Buffers between protected habitat and the urban edge benefit silvery legless lizard by discouraging intrusion by domestic predators (Conservation Measures 1.8 and 1.9). Because the proposed action will protect modeled habitat, restrict recreation near areas protected for the lizard, control pesticide use within Preserves, and require urban-wildland buffers, therefore, the viability of legless lizard will not be compromised.

Alameda Whipsnake

Alameda whipsnake is endemic to the western and central portions of Alameda and Contra Costa Counties. Consequently, the action area constitutes an essential portion of the subspecies'

existing habitat, which has been fragmented into five largely disjunct populations (65 FR 5893). The action area encompasses approximately 75% of the Mount Diablo–Black Hills that supports one of the five populations.

Within the action area, core habitat for Alameda whipsnake is associated with open and low-growing shrubs, primarily chaparral, and surrounding grassland (Figure 4-2 in the HCP/NCCP). Rock outcrops near these areas are thought to be important for the subspecies. Alameda whipsnakes move relatively long distances between scrub patches (distances of up to 4 miles have been documented, but typical distances are closer to 1 mile), and habitat suitable for movement is important for the maintenance of healthy populations. Core and movement habitat types are scattered throughout the central and southwestern portions of the action area.

Direct Effects

Alameda whipsnakes will be affected by the expansion of Clayton that may impact a maximum of 29 acres of core habitat. In total, this represents less than 1% of the total chaparral/scrub habitat within the action area. Expansion of urban development in the action area could result in the loss of up to 341 acres of movement habitat in the action area.

Indirect Effects

Human activities or impacts that increase as the human population grows can also indirectly affect reptiles within the action area. These effects include light pollution, human disturbance, increased numbers of domestic predators (dogs and cats), increased vehicle-related disturbance, and increased risk of wildfire.

Discussion

Alameda whipsnakes will be affected by impacts to a maximum of 29 acres of core habitat and up to 341 acres of movement habitat that may occur because of covered activities. The Preserve System will protect 1,690–1,817 acres of core and perimeter habitat, 10,564–12,166 upland movement habitat, and 46–51 miles of stream movement habitat under the IUDA and MUDA, respectifly. Chaparral will be studied and managed to benefit the species. An average of 70% of currently unprotected core and perimeter whipsnake habitat in Subzones 2a, 2b, 2c, 3a, and Zone 4 will be preserved (Conservation Measure 1.1). Important habitat linkages between chaparral patches will be protected including the linkage in Zone 2 and Subzone 3a between BDMRP and Mount Diablo State Park.

The importance of disturbance (e.g., fire) in maintaining habitat for this species will be investigated and implemented to benefit the species, and diverse canopy-cover stages will be maintained (Conservation Measure 2.8). Movement habitat for Alameda whipsnake will be enhanced through improved management of oak woodland, oak savanna, and annual grassland

(Conservation Measures 1.2, 2.4, and 2.6). Wildfire management measures such as vegetation management, fuel breaks, or prescribed burns will be designed to minimize impacts on and enhance habitat for Alameda whipsnake (Conservation Measure 1.2). Development guidelines will ensure that indirect impacts on this species from covered activities at the urban-wildland interface are avoided or minimized (see Conservation Measures 1.6, 1.9, and 1.10). Control of exotic plants (Conservation Measure 1.4) and control of recreational uses (Conservation Measure 1.5) may also benefit or minimize impacts to Alameda whipsnake. Recreational controls include prohibiting bicycles in core whipsnake habitat and prohibiting construction of new trails in suitable core habitat. The plan will provide substantial conservation of whipsnake core and movement habitat, link existing protected areas for the benefit of this species, and conduct management to maintain and enhance habitat. Less than 1% of suitable core habitat and approximately 2% of suitable movement habitat would be lost as a result of covered activities. Because of the substantial conservation relative to the small impact, the viability of Alameda whipsnake would not be compromised by issuance of the ITP.

Direct Effects on Critical Habitat

Although critical habitat was designated in Contra Costa County, the action area for the HCP/NCCP was excluded as critical habitat for Alameda whipsnake (71 FR 58175).

Giant Garter Snake

Giant garter snake is known from the action area through one historic record near Antioch (Hansen pers. comm.). Modeled habitat (breeding and movement) occurs in the sloughs and adjacent areas associated with agricultural fields.

Direct Effects

According to the model, approximately 14,016 acres of movement and foraging habitat are found in the easternmost portion of the county. Within the action area, development west of Discovery Bay and the eastward expansion of Oakley have the greatest potential to affect garter snake habitat. Most modeled habitat is found within agricultural areas compatible with the biological needs of giant garter snake. Estimated impacts under the MUDA are 0.4mile of modeled breeding habitat (sloughs and channels) and 2,674 acres of modeled movement habitat.

Indirect Effects

Human activities or impacts that increase as the human population grows can also indirectly affect reptiles within the action area. These effects include light pollution, human disturbance, increased numbers of domestic predators (dogs and cats), increased vehicle-related disturbance, and increased risk of wildfire. Contaminated run-off into sloughs/channels from nearby urban

development may indirectly affect giant garter snakes by killing fish that giant garter snakes prey upon.

Discussion

Giant garter snakes will be affected by impacts to a maximum of 0.4-mile of core habitat that may occur because of covered activities. Garter snake habitat will be assessed and compensation achieved using the standard Service compensation formula as specified in the Service guidelines (Conservation Measure 3.6). Between 1 and 3 miles of core habitat will be conserved, and up to 72 acres of slough/channel habitat will be restored to compensate for impacts to covered activities at a ratio of 1:1. Mitigation for temporary impacts involves replanting and hydroseeding disturbed area according to Service guidance. Mitigation for permanent impacts involves preservation of aquatic habitat or upland habitat lost at a ratio of 1:1. In addition, if only aquatic habitat is lost, 2 acres of upland habitat must be preserved for every acre of aquatic habitat lost. The restoration of slough/channel habitats on Dutch Slough and in other areas will also benefit giant garter snake. Development guidelines will ensure that indirect impacts on this species from covered activities at the urban-wildland interface are avoided or minimized (see Conservation Measures 1.6, 1.9, and 1.10). Planning and preconstruction surveys are required in areas with giant garter snake habitat. Seasonal restrictions or buffer zones are required (Section 6.3.3, Chapter 6 in the HCP/NCCP). Because the proposed action will acquire agricultural lands in fee title or in easements, restore sloughs and channel habitat as compensation for impacts, otherwise mitigate through land acquisition for impacts, and avoid impacts to occupied habitat through seasonal restrictions, the viability of giant garter snake will not be compromised.

Western Pond Turtle

Western pond turtles occur in the action area in the Marsh Creek and Kellogg Creek watersheds. Modeled core habitat is found in the many ponds scattered throughout the action area and along Marsh Creek and other streams and creeks. According to the model, there are 4,325 acres of core habitat outside of streams and approximately 33 miles of core habitat along streams. Movement habitat occurs along another 321 miles of streams.

Direct Effects

Impacts to perennial or intermittent streams will be restricted to less than one mile under both urban development scenarios, greatly limiting impacts to this species. Impact will also be restricted to small stream crossings, so will not affect large blocks of habitat for western pond turtles. Urban development is estimated to affect up to 498 acres of core non-stream core habitat for western pond turtle (ponds, sloughs/channels, and wetlands and 0.1-mile of stream core habitat.

Indirect Effects

Turtles require both aquatic and terrestrial habitats for survival. New roads can create barriers between aquatic and terrestrial habitat. Indirect effects that affect streams or ponds, including increased runoff of urban pollutants and spread of nonnative plants, can adversely affect turtles. Human activities or impacts that increase as the human population grows can also indirectly affect turtles within the action area. These effects include light pollution, human disturbance, collection, increased numbers of urban adapted wildlife predators (skunks and raccoons), domestic predators (dogs and cats), increased vehicle-related disturbance, and increased risk of wildfire.

Discussion

Western pond turtle will be affected by impacts to a maximum of 498 acres of non-stream core habitat and 0.1-mile of stream core habitat that may occur because of covered activities. The Preserve System will protect 675–873 acres of core non-stream habitat and 6–7 miles of core stream habitat under the IUDA and MUDA, respectively. Breeding habitat will be created or restored, and basking habitat will be enhanced. A network of core preserves will protect 1,715–1,956 acres of upland breeding and movement habitat.. New preserves will be established adjacent to existing protected land to maintain contiguous wetland-upland complexes (Conservation Measure 1.1). In addition, an estimated 21-22 acres of pond habitat will be created (Tables 5-16 and 5-17 in the HCP/NCCP). Approximately 0.6–0.8-mile of stream habitat will be restored. Pond creation and stream restoration will incorporate habitat requirements for western pond turtles, where appropriate. Additionally, artificial basking substrate and woody debris will be installed in some ponds to increase basking sites for pond turtles (Conservation Measure 3.7). Development guidelines, including stream setbacks, will ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.7, 1.9, and 1.10). Because the proposed action will acquire and protect modeled habitat, restore ponds and streams, enhance basking habitat, and require stream setbacks for all covered activities, the viability of western pond turtle will not be compromised.

California Tiger Salamander

California tiger salamanders occur within the action area in numerous locations. Modeled breeding habitat includes ponds, wetlands, seasonal wetland, and alkali wetlands within annual grassland, oak savanna, and oak woodland. Modeled migration and aestivation habitat includes all non-urban, non-aquatic land cover types within one mile of potential breeding sites. According to the model, 269 acres of breeding habitat and 59,689 acres of migration/aestivation habitat exists.

Effects

It is estimated that urban growth and rural infrastructure projects outside the ULL have the potential to affect approximately 68 acres of breeding habitat (ponds and streams) and up to 5,571 acres of migration/aestivation habitat.

Indirect Effects

Tiger salamanders require both terrestrial and aquatic environments and migrate between the two habitat types. Therefore, they can be particularly sensitive to the effects of urbanization or other growth-related changes that permanently alter either of these environments. New roads and urbanization can create barriers between aquatic and terrestrial habitat. Indirect effects that affect streams or ponds, including increased runoff of urban pollutants, spread of nonnative plants, and increases in nonnative predators, can adversely affect covered amphibians. Tiger salamanders can be affected by sedimentation, changes in water quantity and temperature, and road runoff. Changes in hydrology can favor nonnative predatory species. Human activities or impacts that increase as the human population grows can also indirectly affect tiger salamanders. These effects include light pollution, human disturbance, increased numbers of urban adapted wildlife (skunks and raccoons), domestic predators (dogs and cats), introduction of other nonnative predators, increased vehicle-related disturbance, and increased risk of wildfire.

Discussion

California tiger salamanders will be affected by impacts to a maximum of 68 acres of breeding habitat and 5,571 acres of migration/aestivation habitat that may occur because of covered activities. The Preserve System will protect an estimated 96–111 acres of breeding habitat and 24,047–28,751 acres of migration/aestivation habitat. Breeding habitat will be created and restored, and migration/aestivation habitat will be enhanced. A network of Preserves will protect large blocks of aestivation/migration habitat. New linkages will be protected in blocks of modeled habitat to facilitate dispersal and colonization throughout the action area and movement between breeding sites.

Because tiger salamanders require habitat complexes that include both suitable breeding and upland habitat, areas preserved to achieve the biological goals and objectives for tiger salamanders will include both habitat elements. In addition, to compensate for loss of aquatic habitats (much of which is likely suitable habitat for tiger salamanders), aquatic habitats will be acquired in kind (ratios in Table 5-5 in the HCP/NCCP). An estimated 21-22 acres of pond habitat will be created to both mitigate for impacts and to contribute to recovery as well as 84–85 acres of perennial wetland complex (Tables 5-16 and 5-17 in the HCP/NCCP). Ponds will be designed to support the life-history requirements tiger salamanders, where appropriate (Conservation Measures 2.2 and 2.3). Development guidelines will ensure that indirect impacts on this species from covered activities that occur adjacent to the Preserve System and other open space are minimized (see Conservation Measures 1.6, 1.9, and 1.10). Surveys for suitable

breeding habitat will be conducted prior to submission of application for coverage under the HCP/NCCP. The Service and DFG will be notified of any suitable breeding habitat to be filled prior to construction to allow salvage of juveniles (see Chapter 6, Section 3.6.6). The proposed action is likely to enhance the viability of the species in the action area through the protection of extensive breeding and aestivation habitat, and the creation of up to 22 acres of ponds and 85acres of perennial wetlands, most of which will be suitable for tiger salamanders. Pond management will benefit tiger salamanders Therefore, the viability of California tiger salamander will not be compromised by issuance of the ITP.

California Red-legged Frog

The majority of known occurrences of California red-legged frog in the San Francisco Bay Area are within Contra Costa and Alameda Counties (69 FR 19619). According to the habitat model, there are 95 acres of pond breeding habitat 217 miles of stream breeding habitat, and 70,625 upland acres of movement habitat and 35 miles of stream movement habitat.

Direct Effects

Any urban expansion of the participating cities has the potential to affect suitable stream or pond habitat. It is anticipated that stockponds throughout the action area could serve as habitat if managed for proper hydroperiod, pond structure, vegetative cover, and control of nonnative predators. Because red-legged frogs can disperse over large distances (up to 2 miles), most portions of the action area that are currently undeveloped could serve as movement and/or aestivation habitat. It is estimated that urban growth under this plan has the potential to affect up to 3 acres of breeding habitat (ponds), 7,785 acres of upland movement habitat, and up to 0.6-mile of stream modeled as breeding habitat for red-legged frog.

Indirect Effects

Red-legged frogs require both terrestrial and aquatic environments and migrate between the two habitat types, therefore, they can be particularly sensitive to the effects of urbanization or other growth-related changes that permanently alter or expose either of these environments. New roads and urbanization can create barriers between aquatic and terrestrial habitat. Indirect effects that affect streams or ponds, including increased runoff of urban pollutants, spread of nonnative plants, and spread of nonnative predators, can adversely affect covered amphibians. Amphibians can be affected by sedimentation, changes in water quantity and temperature, and road runoff. Sedimentation increases turbidity thereby reducing the amount of light in the water column and primary nutrient production. Significant sedimentation may also change streambed characteristics. Changes in hydrology can favor nonnative predatory species. Human activities or impacts that increase as the human population grows can also indirectly affect covered amphibians within the action area. These effects include light pollution, human disturbance, increase of urban-adapted predators (skunks and raccoon), increased numbers of domestic

predators (dogs and cats), urban-adapted predators (skunks and raccoons), introduction of other nonnative predators (e.g., bullfrogs), increased vehicle-related disturbance, and increased risk of wildfire.

Discussion

California red-legged frogs will be affected by impacts to a maximum of 3 acres of non-stream breeding habitat, 0.6-mile of stream breeding habitat, and 7,785 acres of upland movement habitat that may result from covered activities. Breeding habitat will be created and restored and upland movement/aestivation habitat will be enhanced. The Preserve System will protect 28–36 acres of pond habitat, 85–98 miles of stream habitat, and 24,455–29,467 acres of upland movement habitat (Table 5-13 in the HCP/NCCP and Conservation Measure 1.1).

Red-legged frog require habitat complexes that include both suitable breeding and upland habitat, therefore, Preserves will include both habitat elements to achieve the biological goals and objectives for red-legged frog. To compensate for loss of habitat for red-legged frog, aquatic habitats will be acquired at a ratio of 1:1. Up to 22 acres of ponds will be created to both mitigate for impacts and to contribute to the recovery of red-legged frog (see Tables 5-16 and 5-17 in the HCP/NCCP). Ponds will be designed to support the life-history requirements of red-legged frog, where appropriate (Conservation Measures 2.2 and 2.3). Stream restoration will enhance habitat for red-legged frog, where appropriate. Development guidelines, including stream setbacks, ensure that effects on this species from covered activities that occur adjacent to preserves or existing open space are minimized (see Conservation Measures 1.6, 1.7, 1.9, and 1.10). Planning surveys for suitable breeding habitat will be conducted prior to submission of application packages for coverage under the HCP/NCCP. The Service and DFG will be notified of any suitable breeding habitat to be filled prior to construction to allow salvage of individuals (see Chapter 6, Section 3.6.6). The proposed action is likely to enhance the species in the action area through the preservation of extensive breeding and high-quality aestivation habitat, providing habitat connectivity between breeding ponds, creating up to 22 acres of ponds, and managing these ponds to enhance populations of red-legged frog. Therefore, the viability of red-legged frog will not be compromised by issuance of the ITP.

Foothill Yellow-Legged Frog

Foothill yellow-legged frogs have the potential to occur in perennial segments of streams in the action area. Core habitat was modeled as perennial streams in riparian wood/scrub, grassland, oak savanna, and oak woodland land cover types. Low-use habitat includes other streams in riparian woodland/scrub, grassland and oak savanna, and oak woodland land cover types. According to the habitat model, there are 20 miles of breeding habitat and 146 miles of migration habitat.

Direct Effects

Foothill yellow-legged frogs would be affected by urban development and infrastructure projects that affect perennial streams. It is estimated that covered activities have the potential to effect up to 0.1-mile of stream breeding habitat or 0.6-miles of stream movement habitat for foothill yellow-legged frogs.

Indirect Effects

Indirect effects on streams, including increased runoff of urban pollutants, spread of nonnative plants, and spread of nonnative predators, can adversely affect covered amphibians. Amphibians can be affected by sedimentation, changes in water quantity and temperature, and road runoff. Sedimentation increases turbidity thereby reducing the amount of light in the water column and primary nutrient production. Significant sedimentation may also change streambed characteristics. Changes in hydrology can favor nonnative predatory species. Human activities or impacts that increase as the human population grows can also indirectly affect covered amphibians within the action area.

Discussion

Foothill yellow-legged frogs will be affected by impacts to a maximum of 0.1-mile of stream breeding habitat and 0.6-mile of stream movement habitat that may occur from covered activities. Approximately 5.2–5.6 miles will be protected, and restoration will create or enhance breeding and foraging habitat for the species. Preserved streams will include both perennial and ephemeral streams; perennial streams provide breeding habitat for foothill yellow-legged frog. Affects to species habitat are likely to be very small (<1% of available habitat). Affects to perennial streams, including suitable foothill yellow-legged frog habitat, will be mitigated at a preservation ratio of 2:1 (Tables 5-5a and 5-5b in the HCP/NCCP). Stream restoration is also required as mitigation (Tables 5-16 and 5-17 in the HCP/NCCP). Stream restoration will be attempted on up to 0.8-mile of existing streams (see Conservation Measures 2.3 and 2.10). Up to 55 acres of riparian woodland/scrub will be created or restored. This habitat will be designed to support the life-history requirements of yellow-legged frog, where feasible, and will also mitigate impacts to stream habitat. Land acquisition in Zone 4 will be focused along Marsh Creek, especially in the upper reaches, where modeled suitable breeding and dispersal habitat for yellow-legged frog is most extensive and under threat. Development guidelines, including stream setback requirements, will ensure that impacts on this species from covered activities are avoided or minimized (see Conservation Measures 1.6, 1.7, 1.9, and 1.10). The proposed action will protect modeled habitat, restore streams and riparian areas throughout the Preserve System, and require stream setbacks for all covered activities, therefore, the viability of yellow-legged frog will not be compromised by issuance of the ITP.

Longhorn Fairy Shrimp

The distribution of shrimp species within the action area is poorly known due to a paucity of surveys for the species and their habitats. Longhorn fairy shrimp occurs in ephemeral pools in sandstone rock outcrops. Although 121 acres of seasonal wetland complexes were mapped within the action area, an additional 483 acres of undetermined wetlands were identified, many of which may be suitable for covered shrimp species. Because these habitat features are difficult to identify from air photos and because access to private lands for field verification was restricted, habitat models for covered shrimp were not developed.

Most vernal pools in the action area are thought to be located either on public lands (Los Vaqueros Watershed, Cowell Ranch State Park; see Chapter 3) or near the Bryon Airport. Most of the seasonal wetlands around the Bryon Airport, including vernal pools, are within the Byron Airport Habitat Management Lands (e.g., Stromberg and Ford 2003). Small, scattered pools may occur in unsurveyed areas of the lower-elevation grassland habitat south of Antioch and Brentwood. Within the action area, longhorn fairy shrimp are known only from the Vasco Caves Regional Preserve.

Direct Effects

No direct affects on longhorn fairy shrimp habitat are anticipated under the Plan, unless additional occupied areas are discovered within the action area.

Indirect Effects

Indirect effects to longhorn fairy shrimp may occur as a result of management and monitoring activities within the Preserve System. Indirect effects on covered shrimp species include altered hydrology from runoff of covered activities, potential effects of the spread of exotic plants, and an increased risk of wildfire from increased human presence.

Discussion

Longhorn fairy shrimp will be affected by impacts to a maximum of 56 acres of seasonal wetland complexes that may occur as the result of covered activities. Within the action area, longhorn fairy shrimp are known only from the Vasco Caves Regional Preserve and one rock outcrop immediately adjacent to it on private land. Accordingly, no direct affects on longhorn fairy shrimp habitat are expected unless additional occupied areas are discovered within the permit area outside the Vasco Caves Regional Preserve. Approximately 129-168 acres of seasonal wetland complexes will be conserved, and 104-163 acres of seasonal wetland complexes will be created or restored (Table 5-5a and 5-5b in the HCP/NCCP and Conservation Measures 1.1 and 2.3). Because longhorn fairy shrimp are associated only with rock outcrops in this area, it is unknown whether protection and restoration of wetland complexes will be of any benefit to the

species. Similarly, while some affects to seasonal wetland complexes are anticipated, there are no predicted impacts on the rock outcrops specifically known to support the species. Prior to submission of an application package, planning surveys will identify modeled habitat for covered shrimp species. Preconstruction surveys are required in areas with modeled habitat. If occupied sites are identified, buffer zones or seasonal restrictions are required (Chapter 6, Section 6.3.3). If seasonal wetlands are occupied by covered shrimp, applicants must compensate for impacts to these wetlands according to Conservation Measure 3.8. Applicants have the option of assuming presence of covered shrimp in lieu of conducting presence/absence surveys and compensating accordingly. Therefore, because the proposed action will protect modeled habitat, restore ponds and wetlands, require additional mitigation for occupied habitat, require seasonal restrictions for occupied habitat, the viability of longhorn fairy shrimp will not be compromised.

Direct Effects on Critical Habitat

Habitat for longhorn fairy shrimp in Contra Costa County is described sandstone rock outcroppings that seasonally pool water, which represent a unique habitat type for the species and helps maintain a diversity of habitat types in which the species can be found across its known range. Longhorn fairy shrimp has approximately 300 acres of designated critical habitat in the action area wholly within Vasco Caves Regional Preserve (Unit 1A). There are no affects anticipated from covered activities to Vasco Caves Regional Preserve.

Vernal Pool Fairy Shrimp, Midvalley Fairy Shrimp, Vernal Pool Tadpole Shrimp

The distribution of shrimp species within the action area is poorly known due to a paucity of surveys for the species and their habitats. Seasonal wetlands and vernal pools provide core habitat for all the covered shrimp species except longhorn fairy shrimp. Although 121 acres of seasonal wetland complexes were mapped within the action area, an additional 483 acres of undetermined wetlands were identified, many of which may be suitable for covered shrimp species. These habitat features are difficult to identify from air photos and because access to private lands for field verification was restricted, habitat models for covered shrimp were not developed.

Most vernal pools in the action area are thought to be located either on public lands (Los Vaqueros Watershed, Cowell Ranch State Park; see Chapter 3) or near the Bryon Airport. Most of the seasonal wetlands around the Bryon Airport, including vernal pools, are within the Byron Airport Habitat Management Lands (e.g., Stromberg and Ford 2003). Small, scattered pools may occur in unsurveyed areas of the lower-elevation grassland habitat south of Antioch and Brentwood. Areas in which additional vernal pools could be found are expected to experience limited affects both in absolute acreage and relative to the overall proportion of available vernal pool habitat. Of the 604 acres of seasonal wetland complexes and undetermined wetlands identified in the action area, an estimated 43 acres would be lost to covered activities under the IUDA and 56 acres under the MUDA. This represents the maximum amount of habitat loss for all covered shrimp (assuming all 56 acres are suitable habitat).

Indirect Effects

Indirect effects on covered shrimp species include altered hydrology from runoff of covered activities, potential effects of the spread of exotic plants, and an increased risk of wildfire from increased human presence.

Discussion

These fairy shrimp species will be affected by impacts to a maximum of 56 acres of seasonal wetland complexes that may occur as a result of covered activities. The HCP/NCCP will conserve approximately 129-168 acres of seasonal wetland complexes outside of parks and open space, and 104-163 acres of seasonal wetland complexes will be created or restored (Table 5-5a and 5-5b in the HCP/NCCP and Conservation Measures 1.1 and 2.3), some of which is expected to be suitable for Midvalley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp. Restored seasonal wetlands will be evaluated to determine if covered crustaceans are present at frequencies similar to those in natural seasonal wetland complexes. If not, the IE will assess the feasibility of transplanting species from occupied wetlands to restored wetlands to establish new populations. Prior to submission of an application package, planning surveys will identify modeled habitat for covered shrimp species. Preconstruction surveys are required in areas with modeled habitat. If occupied sites are identified, buffer zones or seasonal restrictions are required (Chapter 6, Section 6.3.3). If seasonal wetlands are occupied by covered shrimp, applicants must compensate for impacts to these wetlands according to Conservation Measure 3.8. Applicants have the option of assuming presence of covered shrimp in lieu of conducting presence/absence surveys and compensating accordingly. Therefore, because the proposed action will protect modeled habitat, restore ponds and wetlands, require additional mitigation for occupied habitat, require seasonal restrictions for occupied habitat, the viability of Midvalley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp will not be compromised.

Direct Effects on Critical Habitat

Critical habitat for vernal pool fairy shrimp is found within the action area in two subunits. Subunit 19A is located south of Brentwood near the Marsh Creek Reservoir. Subunit 19B is located north, west, and south of the Byron Airport. Limited urban growth or covered rural infrastructure projects will occur in the area where critical habitat is designated. Covered rural infrastructure projects that may affect critical habitat include the Vasco Road Widening, the Vasco Road–Byron Highway Connector (depending on its siting), and expansion of the Byron Airport. Table 4-7 in the HCP/NCCP shows the estimated overlap of critical habitat for vernal pool fairy shrimp in subunits 19A and 19B and activities covered by the Plan. There are 2.4 acres of overlap between covered activities and wetland land-cover types that may support critical habitat for this species. Another 35.3 acres of annual grassland and alkali grassland within critical habitat for vernal pool fairy shrimp may be affected by covered activities. Small wetland features within these grassland types may also constitute critical habitat for this species.

Critical habitat for vernal pool tadpole shrimp does not occur in the action area so there would be no effects on critical habitat for this species. Midvalley fairy shrimp has not been federally listed, therefore, there is no designated critical habitat.

Mount Diablo Manzanita

Direct Effects on Known Occurrences

Covered activities within the urban development area would not result in the removal of any known occurrences of Mount Diablo manzanita. Covered activities outside the urban development area, including road grading, road expansion, utility construction and maintenance, and habitat restoration could directly effect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine the effects to this plant.

Direct Effects

Covered activities in the action area would not result in the loss of any modeled habitat for Mount Diablo manzanita, and therefore, impacts to Mount Diablo manzanita is not expected.

Indirect Effects

Utility operations and maintenance may have temporary or low-impact indirect effects on Mount Diablo manzanita or suitable habitat at or near the site of maintenance activities. Maintenance vehicles traveling on access roads or off road to conduct routine procedures or emergency repairs of powerlines, waterlines, or gas pipelines may cause injury or mortality of covered plants. Mount Diablo manzanita may be subject to indirect adverse effects through the increased risk of wildfire associated with a growing human population. While this species would benefit from infrequent fires, frequent fires could result in the conversion of the chaparral habitat this species occupies to annual grassland.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of Mount Diablo manzanita in the action area for the following reasons: (1) no known occurrences of this species would be affected by covered activities, while two occurrences will be protected if willing sellers are found, (2) no modeled habitat would be removed by covered activities under the initial urban development area, and a maximum of 2 acres would be removed under the MUDA, while 414 acres would be protected (447 under the MUDA), and (3) Preserve management will attempt to enhance habitat quality for this species and maintain the viability of Mount Diablo manzanita populations. Therefore, the proposed

action will not compromise the viability of Mount Diablo manzanita occurrences in the action area, nor will it compromise the viability of the species generally.

Brittlescale

Direct Effects on Known Occurrences

Covered activities within the urban development area may result in the removal of one known occurrence of brittlescale. Covered activities outside the urban development area could directly affect populations of this species through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects to this plant.

Direct Effects

Covered activities in the action area may result in the loss of 81 acres of modeled habitat for brittlescale, and one occurrence of brittlescale, in the Byron area.

Indirect Effects

Indirect effects of covered activities to this species are similar to those discussed for Mount Diablo manzanita above, except that this species is not as vulnerable to increased fire frequency. In addition, increases in the spread of non-native plant species due to human population growth and new road construction may lead to increased competition for this species, and increases in human use of recreational areas may adversely affect this species through increased trampling.

Discussion

Issuance of the proposed ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of brittlescale in the action area for the following reasons: (1) one occurrence of this species would be affected by covered activities, while two occurrences will be protected if willing sellers are found (four occurrences under the maximum urban development area); (2) 81 acres of modeled habitat would be removed by covered activities, while at least 577 acres would be protected (697 acres under the MUDA) and over 60 acres would be restored, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of brittlescale populations by removing non-native invasive plants. Therefore, the proposed action will not compromise the viability of brittlescale in the action area, nor will it compromise the viability of the species generally.

San Joaquin Spearscale

Direct Effects on Known Occurrences

Covered activities within the urban development area would not result in the removal of any known occurrences of San Joaquin spearscale. Covered activities outside the urban development area may directly affect populations of this species through direct mortality or loss of habitat, but location data are not sufficient to precisely determine the affects to this plant.

Direct Effects

Covered activities in the action area would result in the loss of an unknown amount of San Joaquin spearscale habitat. Sufficient data were not available to model habitat for this species. However, if habitat for this species is broadly defined to include all alkali grassland and alkali wetland in the action area, covered activities would result in the loss of up to 115 acres of alkali grassland, and up to approximately 31 acres of alkali wetland complex, in the action area. This likely overstates the potential impact to San Joaquin spearscale, but it is the best available estimate of worst-case impacts. Habitat loss would occur in the Byron area.

Indirect effects

Indirect effects of covered activities to this species are similar to those discussed for brittlescale above.

Effects of the Proposed Conservation Measures

As noted above, protection of up to 1,250 acres of alkali grassland under the MUDA, and up to 96 acres of alkali wetland is likely to provide habitat for San Joaquin spearscale, which is often associated with brittlescale. One of the goals of preserve management will be to enhance habitat for this species through removal of non-native species. In addition, approximately 61-67 acres of alkali wetlands will be restored within Preserves, providing additional spearscale habitat.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of San Joaquin spearscale in the action area for the following reasons: (1) no known occurrences of this species would be affected by covered activities, (2) up to 146 acres potential San Joaquin spearscale habitat would be removed, while at least 577 acres (697 under the MUDA) of modeled brittlescale habitat, which is analogous to San Joaquin spearscale habitat, would be protected, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of San Joaquin spearscale populations.

Therefore, the proposed action will not compromise the viability of San Joaquin spearscale occurrences in the action area, nor will it compromise the viability of the species generally.

Big Tarplant

Direct Effects on Known Occurrences

Covered activities within the urban development area may result in the removal of one out of five known occurrences of big tarplant outside public land. This occurrence is presumed extant, but it was last seen in 1937, and land cover mapping of the site indicates that ruderal areas, cropland, aquatic, and urban development are the only land cover types in the immediate vicinity. Covered activities outside the urban development area may directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects.

Direct Effects

Covered activities in the action area may result in the loss a maximum of 2,248 acres of modeled habitat for big tarplant, and up to 1,999 acres of modeled low-potential habitat for this species. Habitat loss would occur primarily on the southern edge of the urban development area in Pittsburg, Antioch, and Brentwood, as well as in Byron.

Indirect Effects

Indirect effects of covered activities to this species are similar to those discussed for brittlescale above.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of big tarplant in the action area for the following reasons: (1) only one known occurrence of this species would be affected by covered activities, while three occurrences will be protected if willing sellers are found, (2) up to 4,247 acres of modeled habitat and modeled low-potential habitat would be removed by covered activities, while 9,300 acres (11,395 acres under the MUDA) would be protected, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of big tarplant populations. Therefore, the proposed action will not compromise the viability of big tarplant in the action area, nor will it compromise the viability of the species generally.

Mount Diablo Fairy Lantern

Direct Effects on Known Occurrences

Covered activities within the urban development area would not result in the removal of any known occurrences of Mount Diablo fairy lantern. Covered activities outside the urban development area may directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects to this plant.

Direct Effects

Covered activities in the action area may result in the loss of 788 acres of modeled habitat for Mount Diablo fairy lantern. The habitat that could be lost is located south of Pittsburg and southwest of Antioch.

Indirect Effects

Indirect effects of covered activities to this species are similar to those discussed for Brittlescale above. In addition, this species may suffer from increased collecting due to increased recreational use in areas where it is found.

Discussion

Issuance of the proposed permits to the Permittees will provide the conditions necessary for the permanent maintenance of a stable, protected population of Mount Diablo fairy lantern in the action area for the following reasons: (1) no known occurrences of this species would be impacted by covered activities, while one occurrence will be protected if a willing seller is found, (2) a maximum of 788 acres of modeled habitat may be removed, while 11,178–13,360 acres would be protected and 42–165 acres of oak savanna habitat would be restored, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of Mount Diablo fairy lantern populations. Therefore, the proposed action will not compromise the viability of Mount Diablo fairy lantern in the action area, nor will it compromise the viability of the species generally.

Recurved Larkspur

Direct Effects on Known Occurrences

Covered activities within the urban development area may result in the removal of 1 out of 3 known occurrences of recurved larkspur outside public land in the Byron area. Covered activities outside the urban development area could directly effect populations of this species,

through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects to this plant.

Direct Effects on Modeled Habitat

Covered activities may result in the loss of up to 25 acres of modeled habitat for recurved larkspur in the Byron area.

Indirect Effects

Indirect effects of covered activities to this species are similar to those discussed for Brittlescale above.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of recurved larkspur in the action area for the following reasons: (1) one known occurrence of this species would be impacted by covered activities, while two occurrences will be protected if willing sellers are found, (2) up to 25 acres of modeled habitat may be removed by covered activities, while 389–1,064 acres would be protected, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of recurved larkspur populations. Therefore, the proposed action will not compromise the viability of recurved larkspur in the action area, nor will it compromise the viability of the species generally.

Round-Leaved Filaree

Direct Effects on Known Occurrences

Covered activities within the urban development area may result in the removal of two known occurrences of round-leaved filaree in the Antioch area. Covered activities outside the urban development area could directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to determine precisely the effects to this plant.

Direct Effects

Covered activities in the action area may result in the loss of a maximum of 888 acres (15% of currently unprotected modeled primary habitat within the action area) of modeled primary habitat for round-leaved filaree in the western part of Pittsburg and the southern parts of Antioch and Brentwood. In addition, covered activities may result in the loss of up to 560 acres (16% of currently unprotected modeled secondary habitat within the action area) of modeled secondary

habitat for this species in the western and southern parts of Pittsburg, the southern parts of Antioch and Brentwood, and the Byron area.

Indirect Effects

Indirect effects of covered activities to this species are similar to those discussed for brittlescale above.

Discussion

Issuance of the proposed ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of round-leaved filaree in the action area for the following reasons: (1) two known occurrences of this species would be affected by covered activities, while at least two occurrences will be protected if willing sellers are found, (2) up to 1,448 acres of modeled primary and secondary habitat may be removed by covered activities, while 2,877–2,997 acres of modeled primary habitat, and 542–633 acres of modeled secondary habitat may be protected, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of round-leaved filaree populations. Therefore, the proposed action will not compromise the viability of round-leaved filaree in the action area, nor will it compromise the viability of the species generally.

Diablo Helianthella

Direct Effects on Known Occurrences

Covered activities within the urban development area would not result in the removal of any known occurrences of Diablo helianthella. Covered activities outside the urban development area may directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects to this plant.

Direct Effects on Modeled Habitat

Covered activities in the action area may result in the loss of a maximum of 85 acres of modeled habitat for Diablo helianthella in southwest Antioch.

Indirect Effects

Indirect effects from covered activities on this species would be similar to those discussed above for Brittlescale. In addition, fire suppression associated with increased development may result in the expansion of chaparral and the consequent loss of the chaparral openings and edges where this species is found.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of Diablo helianthella in the action area for the following reasons: (1) no known occurrences of this species would be impacted by covered activities, while two occurrences will be protected if willing sellers are found, (2) 85 acres of modeled habitat may be removed by covered activities, while 6,168–7,250 acres would be protected and 42–165 acres of oak savanna (potential habitat) would be restored, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of Diablo helianthella populations. Therefore, the proposed action will not compromise the viability of Diablo helianthella in the action area, nor will it compromise the viability of the species generally.

Brewer's Dwarf Flax

Direct Effects on Known Occurrences

Covered activities within the urban development area would not result in the removal of any known occurrences of Brewer's dwarf flax. Covered activities outside the urban development area could directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects to this species.

Direct Effects on Modeled Habitat

Covered activities in the action area may result in the loss of 97 acres (255 acres under the MUDA) of modeled habitat for Brewer's dwarf flax. The habitat loss would occur in southern Pittsburg and southwest of Antioch.

Indirect Effects

Recreational access to the Preserve System may lead to increased trampling.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of Brewer's dwarf flax in the action area for the following reasons: (1) no known occurrences of this species would be impacted by covered activities, while one occurrence will be protected if willing sellers are found, (2) Between 97and 255 acres of modeled habitat may be removed by covered activities, while between 9,337 and 10,704 acres would be protected, and 42–165 acres of oak savanna (potential habitat) would be restored, and (3) preserve management will attempt to enhance habitat quality for this species and maintain the viability of Brewer's dwarf flax populations. Therefore, the proposed action will not

compromise the viability of Brewer's dwarf flax in the action area, nor will it compromise the viability of the species generally.

Showy Madia

Direct Effects on Known Occurrences

Covered activities within the urban development area would not result in the removal of any known occurrences of showy madia. Covered activities outside the urban development area could directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects to this plant.

Direct Effects

Covered activities in the action area could result in the loss of 2,533 acres of annual grassland, 42 acres of oak savanna, and 21 acres of oak woodland (4,152 acres, 165 acres, and 73 acres, respectively, under the MUDA).

Indirect Effects

This species could be subject to indirect adverse effects through increases in trampling and collection as a result of access to the Preserve System for recreational areas, the spread of invasive nonnative plants, or the increased risk of wildfire associated with a growing human population.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of showy madia in the action area for the following reasons: (1) no known occurrences of this species would be impacted by covered activities; (2) impacts to this plant will only be permitted as occurrences are identified and added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP); (3) approximately 2,533 acres of annual grassland, 42acres of oak savanna, and 21 acres of oak woodland (4,152, 165 and 73 acres, respectively, under the MUDA) would be removed by covered activities, while 13,000–16,500 acres of grassland, 500 acres of oak savanna and 400 acres of oak woodland acres would be protected, and 52–175 acres of oak savannah habitat will be restored; and (4) Preserve management will attempt to enhance habitat quality for this species through removal of nonnative plants. Therefore, the proposed action will not compromise the viability of showy madia in the action area, nor will it compromise the viability of the species generally.

Adobe Navarettia

Direct Effects on Known Occurrences

Covered activities within the urban development area could result in the removal of one out of three known occurrences of adobe navarettia outside public lands in the Byron Hot Springs and San Creek area. However, it is not possible to determine whether these occurrences would be removed due to Covered Activities under the HCP/NCCP because the exact locations of these occurrences are not known. Covered activities outside the urban development area could directly affect populations of this species, through direct mortality or loss of habitat, but location data are not sufficient to precisely determine effects.

Direct Effects on Modeled Habitat

Covered activities in the action area may result in the loss of 2,533 acres of annual grassland and 42 acres of seasonal wetland (4,152 acres of annual grassland and 56 acres of seasonal wetland under the MUDA) that may provide habitat for adobe navarettia. No species distribution model could be developed for adobe navarettia because of a lack of data on the species' habitat requirements.

Indirect Effects

Indirect effects on this species are similar to those discussed above for brittlescale.

Discussion

Issuance of the ITP will provide the conditions necessary for the permanent maintenance of a stable, protected population of adobe navarretia in the action area for the following reasons: (1) one occurrence of this species could be affected by covered activities while one occurrence (Horse Valley) would be protected if willing sellers are found, (2) additional take of one occurrence will be permitted and subsequent take will only be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP), and (3) 129–168 acres of seasonal wetland and 13,000–16,500 acres of grassland will be conserved, an additional 104-163 acres of seasonal wetland complexes will be created or restored, and preserve management will attempt to enhance habitat quality for this species and maintain the viability of adobe navarretia populations. Therefore, the proposed action will not compromise the viability of adobe navarretia in the action area, nor will it compromise the viability of the species generally.

Contra Costa Goldfields

Contra Costa goldfields is designated a "no-take" species in the HCP/NCCP. As such, killing, damage or removal of this species is not authorized under this Plan. The Service has designated 3,406 acres in the action area as critical habitat for Contra Costa goldfields in and around Bryon Hot Springs and the Byron Airport (Unit 7; 68 FR 46683). Habitat for this species at this site may include alkali grassland, annual grassland, and seasonal wetland. Up to 1.1 acres of critical habitat for Contra Costa goldfields may be affected by covered activities (Table 4-7 in the HCP/NCCP).

Large-Flowered Fiddleneck

Large-flowered fiddleneck is designated a "no-take" species in the HCP/NCCP. As such, killing, damage or removal of this species is not authorized under this Plan. There are no natural occurrences of this species in the action area. Two experimental populations have been established in BDMRP, but the covered activities would not affect these populations. Therefore, no known occurrences of this species would be impacted by covered activities within the action area.

CUMULATIVE EFFECTS

The Service must consider both the effects of the proposed action and the cumulative effects of other activities in determining whether the action is likely to jeopardize the continued existence of a listed species or result in the adverse modification of critical habitat. Cumulative effects are defined as the effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal Action under review (50 CFR 402.02). Future Federal actions are not considered cumulative to the proposed action because they are required separate consultation pursuant to section 7 of the Act.

It is expected that the majority of lawful, non-Federal actions within the UDA for the life of the permit will fall under the purview of the proposed permit and are, therefore, considered as effects of the proposed action rather than cumulative effects.

The HCP/NCCP anticipates up to 14,502 acres of development will occur in the action area during the 30-year life of the ITP. Section 4.6 of the HCP/NCCP discusses a number of projects and activities that have the potential to contribute to cumulative impacts on species. Section 4.6 also includes the Los Vaqueros Reservoir Expansion; however, under the definition of cumulative effects above, it is not included in this section as it will be a Federal action that will require consultation under section 7 of the Act. They are (1) urban development in Antioch, a jurisdiction in the action area that is not a Permittee, (2) ongoing and routine agriculture, (3) wind-turbine operation and repowering, and (4) use of existing roads. Not all Covered Species are anticipated to be impacted through cumulative effects.

San Joaquin Kit Fox

The southward expansion of Antioch would affect core habitat for San Joaquin kit fox and degrade or potentially eliminate the widest and best-functioning potential movement route for the species (see Chapter 5 of the HCP/NCCP for a more detailed evaluation of these movement routes). Approximately 2,607 acres of annual grassland could be removed by urban development within Antioch.

On-going and routine agriculture may convert grassland habitat used by kit foxes to vineyards, orchards or row crops. Kit foxes may be injured or killed in their dens through discing and/or deep ripping.

Construction of turbines and their access roads also removes or degrades habitat for San Joaquin kit fox. Construction of roads required to access wind turbines removes available grassland that provide foraging habitat and denning opportunities for kit fox. In addition, rodenticide poisoning in the vicinity of wind turbines to reduce damage to the turbine footings and decrease prey availability for raptors to prevent bird strikes may kill or injure kit foxes if they eat the poison bait or through secondary poisoning by eating poisoned ground squirrels. Reduction in ground squirrel numbers results in decreased prey availability for kit foxes. Monitoring activities associated with wind-turbine use may disturb San Joaquin kit fox. In addition, the construction of rural roads covered by this Plan is expected to increase mortality of San Joaquin kit fox. Continued use of existing rural roads (i.e., those not covered by the Plan) will contribute to a cumulative impact on the species through continued mortality and injury. The magnitude of this cumulative impact is unknown.

Covered Birds

All four covered bird species (Tricolored blackbird, golden eagle, burrowing owl, Swainson's hawk) would be affected by Antioch's expansion. Rodent control from ongoing activities on grazing lands and adjacent to wind turbines may adversely affect golden eagle, western burrowing owl and some ongoing cultivated agricultural activities may limit or degrade habitat for tricolored blackbird, western burrowing owl, and Swainson's hawk.

The area supporting wind turbines provides important breeding and foraging habitat for many raptors, including golden eagle and western burrowing owl. Operation of these wind turbines is a serious hazard to many birds, especially red-tailed hawk, American kestrel, western burrowing owl, and golden eagle (Orloff and Flannery 1992, 1996; Thelander and Rugge 2000; National Wind Coordinating Committee 2001; Thelander et al. 2003). These ongoing impacts to raptors, including western burrowing owl and golden eagle, are expected to continue in the foreseeable future. Effects may diminish over time as wind turbines are repowered and replaced with fewer, larger turbines in areas that attract fewer raptors (e.g., the Buena Vista project in Contra Costa County).

Aquatic and Semi-Aquatic Covered Species

The four aquatic and semi-aquatic Covered Species (California red-legged frog, California tiger salamander, western pond turtle, and giant garter snake) could be affected by the cumulative projects. Suitable California red-legged frog and California tiger salamander habitat is present within the proposed expansion area of Antioch and urban development would remove or isolate ponds and degrade streams. In addition, ongoing ranching operations may limit or degrade habitat for riparian species such as western pond turtle, California tiger salamander, California red-legged frog, and foothill yellow-legged frog. Rodent control on grazing lands and adjacent to wind turbines adversely affects California tiger salamander and California red-legged frog by decreasing the number of ground squirrels that create burrows into which both species seek refuge. California red-legged frogs are found in ground squirrel burrows during the summer months as ponds draw down and burrows provide a cooler environment. Adult California tiger salamanders also use ground squirrel burrows to aestivate in after leaving the breeding ponds. Juvenile tiger salamanders may spend years in burrows before emerging to enter breeding ponds. Some ongoing cultivated agricultural activities may limit or degrade habitat for giant garter snake. Discharge of pesticide contaminated water into giant garter snake habitat may kill or injure giant garter snake and fish which they prey upon. Construction of turbines and their access roads also removes or degrades habitat for California red-legged frog, and California tiger salamander. Continued use of existing rural roads (i.e., those not covered by the Plan) will contribute to a cumulative impact on these species through continued mortality and injury. The magnitude of this cumulative impact is unknown.

Alameda Whipsnake

Alameda whipsnake is vulnerable to cumulative effects because of its restricted range and association with chaparral and scrub habitats. Three acres of chaparral/scrub habitat is located within Antioch and could be impacted by the expansion of Antioch.

Plants

Cumulative effects to covered plant species may occur as a result of the potential expansion of the City of Antioch's development area, and ongoing and routine agricultural activities.

The proposed expansion area for the City of Antioch includes 13 acres of modeled primary habitat and 64 acres of modeled secondary habitat for Brewer's dwarf flax, and 267 acres of modeled primary habitat and 267 acres of modeled secondary habitat for big tarplant. A portion of this habitat could be lost as a result of development in that area.

Ongoing and routine agricultural activities in the action area could contribute to small cumulative effects on covered plants through trampling by cattle or changes in agricultural practices that diminish currently available habitat for Covered Species. Plant species most likely to be affected by these cumulative ongoing and routine agricultural activities are San Joaquin spearscale,

brittlescale, and recurved larkspur. Overgrazing is noted as a primary threat to these species (California Natural Diversity Database 2005; California Native Plant Society 2005).

CONCLUSIONS

Federally Listed, Proposed and Delisted Species

After reviewing the current status of the endangered San Joaquin kit fox, longhorn fairy shrimp, vernal pool tadpole shrimp, Contra Costa goldfields, and large-flowered fiddleneck, and the threatened giant garter snake, Alameda whipsnake, California tiger salamander, California red-legged frog, and vernal pool fairy shrimp, the environmental baselines for the action area, and the effects of the proposed action, including all measures proposed to avoid, minimize, and mitigate adverse effects and the cumulative effects, it is the Service's biological opinion that the issuance of an ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of these species for the reasons stated below. See Table ES-3 of the Plan for additional information.

It is the Service's biological opinion that the issuance of ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of San Joaquin kit fox. Implementation of the HCP/NCCP will result in the loss of up to 4,576 acres of unprotected modeled core habitat in the action area, however, the Plan will protect up between 17,164 and 20,465 acres of modeled core habitat, link existing open space in the action area to create a system of connected habitat, protect movement habitat from the Alameda County line to BDMRD, and establish management of small mammals to enhance kit fox habitat. Critical habitat for San Joaquin kit fox has not been designated by the Service, so there will no effect on critical habitat.

It is the Service's biological opinion that the issuance of an ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of longhorn fairy shrimp because no direct impacts under the HCP/NCCP are anticipated. Up to 177 acres of wetland complexes will be acquired and 104-163 acres of seasonal wetland complexes will be restored. Because longhorn fairy shrimp is associated only with rock outcrops in the action area, it is unknown if these actions will benefit the species. The Plan will also link habitat, including wetland complexes, and require additional mitigation (beyond wetland mitigation) for any effects to occupied habitat. Critical habitat for longhorn fairy shrimp in the action area is wholly within the Vasco Caves Regional Preserve where no impacts are anticipated.

It is the Service's biological opinion that the issuance of ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Contra Costa Goldfields. Implementation of the Plan will result in the loss of a maximum of 1.1 acres of critical habitat for Contra Costa goldfield to be removed due to covered activities in the action area. This represents 0.03% of mapped critical habitat in the action area. Removal of 0.03% of critical habitat will not substantially and adversely modify critical habitat within the species' range. No occurrences of Contra Costa goldfields are known in the action area, and the species is

designated as a no-take species under the HCP/NCCP. As such, applicants must demonstrate avoidance by conducting surveys for this species at the appropriate time of year. If occurrences of the species are found, the species will be fully avoided.

It is the Service's biological opinion that the issuance of an ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of large-flowered fiddleneck because no natural populations are known in the action area, and large-flowered fiddleneck is designated as a no-take species under the HCP/NCCP. As such, applicants must demonstrate avoidance by conducting surveys for this species at the appropriate time of year. If occurrences of the species are found, the species will be fully avoided.

It is the Service's biological opinion that the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of giant garter snake. Implementation of the Plan will result in the loss of up to 0.3 miles of core habitat. Implementation of the Plan will protect 1–3 miles of core habitat and 72 acres of slough/channel will be created or restored. Critical habitat for giant garter snake has not been designated by the Service, so there will no effect on critical habitat.

It is the Service's biological opinion that the issuance of an ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Alameda whipsnake. Implementation of the HCP/NCCP will result in the loss of up to 29 acres of unprotected modeled core habitat and 341 acres of modeled movement habitat. Implementation of the HCP/NCCP will protect between 1,69 and 1,817 acres of modeled core habitat and between 10,564 and 12,166 acres of movement habitat. Important habitat linkages between chaparral patches will be protected including the linkage in Zone 2 and Subzone 3a between BDMRP and Mount Diablo State Park. Management actions that investigate and implement disturbance to maintain or promote chaparral/scrub habitat for the snake are required under the plan. Movement habitat will be enhanced through management of oak woodland, oak savanna, and annual grassland. There is no critical habitat designated for Alameda whipsnakes within the Plan boundaries.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of California tiger salamander. Implementation of the HCP/NCCP will result in the loss of 68 acres of breeding habitat and 5,571 acres of modeled migration/aestivation habitat. Implementation of the Plan will protect between 96 and 111 acres of modeled breeding habitat and between 24,047 and 28,751 acres of migration/aestivation habitat. Important habitat linkages between wetland and pond complexes will be protected and between 21-22 acres of ponds and 84–85 acres of perennial wetland complex will be restored. Ponds will be designed specifically to support the life-history requirements of the tiger salamander, when appropriate. Critical habitat for California tiger salamander does not occur within the action area, so there will no effect on critical habitat.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of California red-legged frog. Implementation of the HCP/NCCP will result in the loss of up to 3 acres of non-stream breeding habitat, 0.6-mile of stream breeding habitat and 7,785 acres of upland movement habitat. Implementation of the Plan will protect between 28 and 36 acres of non-stream breeding habitat, between 85 and 98 miles of stream breeding habitat, and between 24,455 and 29,467 acres of upland movement habitat. Important habitat linkages between wetland and pond complexes will be protected, and between 21-22 acres of ponds and 84–85 acres of perennial wetland complex will be restored. Where appropriate, ponds will be designed specifically to support the life-history requirements of the red-legged frog, and, where appropriate, streams will be enhanced to for the species. Critical habitat was not designated within the HCP/NCCP boundaries.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of vernal pool fairy shrimp or vernal pool tadpole shrimp. Implementation of the HCP/NCCP are anticipated a maximum of 59 acres of habitat for these species. Implementation of the Plan will protect between 129 acres and 168 acres of wetland complexes and between 104 and 163 acres of seasonal wetland, complexes will be protected and restored. The Plan will also link habitat, including wetland complexes, and require additional mitigation (beyond wetland mitigation) for any effects to occupied habitat. There are potential minor effects on critical habitat for vernal pool fairy shrimp (subunits 10A and B). There are an estimated 2.4 acres of potential impact to the wetland land-cover type that may support critical habitat for the species. Another 35.5 acres of annual and alkali grasslands, which may contain wetland features that constitute critical habitat, could be impacted. Limited urban growth or covered rural infrastructure projects will occur in the area where critical habitat is designated, but removal of this critical habitat will not substantially and adversely modify critical habitat within the species' range. Critical habitat for vernal pool tadpole shrimp does not occur in the action area so there would be no effects on critical habitat for this species.

Other Covered Species—Not Federally-Listed as Threatened or Endangered

After reviewing the current status of the currently unlisted Swainson's hawk, tricolored blackbird, western burrowing owl, Townsend's western big-eared bat, western pond turtle, silvery legless lizard, foothill yellow-legged frog, midvalley fairy shrimp, Mount Diablo manzanita, brittlescale, San Joaquin spearscale, big tarplant, Mount Diablo fairy lantern, recurved larkspur, round-leaved filaree, Diablo helianthella, Brewer's dwarf flax, showy madia, and adobe navarretia the environmental baselines for the action area, and the effects of the proposed action, including all measures proposed to avoid, minimize, and mitigate adverse effects and the cumulative effects, it is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of these species for the reasons discussed below. No critical habitat has been designated for any of the following species as they are not listed under the Act.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Swainson's hawk. Implementation of the HCP/NCCP will affect a maximum of 16 acres of breeding habitat 4,743 acres of foraging habitat. Implementation of the Plan will protect between 12 and 16 acres of modeled core habitat and between 2,096 and 2,757 acres of foraging habitat, restore riparian habitat, acquire conservation easements, and manage Preserves to increase the number of small mammals to enhance Swainson's hawk habitat.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of tricolored blackbird. Implementation of the HCP/NCCP will result in the loss of up to 204 acres of core habitat and 9,621 acres of primary foraging habitat birds,. Implementation of the Plan will protect between 126 and 164 acres of modeled core habitat and between 16,474 and 20,138 acres of primary foraging habitat, target habitat restoration for tricolored blackbird, and avoid direct effects to the species.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of western burrowing owl. Implementation of the HCP/NCCP will result in the loss of a maximum of 5,755 acres of breeding and foraging habitat. Implementation of the Plan will protect between 16,675 and 19,844 acres of breeding and foraging habitat, enhance grasslands and other natural land-cover types, acquire agricultural easements, and improve habitat quality through conservation measures such as artificial perches.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Townsend's big-eared bat. There will be no direct effects to known roosting habitat. Affects to 4,152 acres of grassland and 162 acres of wetlands will have minor effects on availability of foraging and watering habitat for bats. The plan will protect between 13,000 acres and 16,500 acres of grassland habitat that may be useful for foraging, and protect roosting sites (caves, abandoned buildings, and abandoned mines). The action area represents a small portion of the species range, and any negative impacts to the bat resulting from the proposed action will not compromise the viability of the species as a whole.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of western pond turtle. Implementation of the HCP/NCCP will result in the loss of a maximum of 498 acres of non-stream core habitat and 0.1-mile of stream core habitat. Plan implementation will protect between 675 and 873 acres of core non-stream habitat and between 6 and 7-miles of core stream habitat, 6-15 acres of pond habitat will be created, 0.3–0.4-mile of stream habitat will be restored, basking habitat will be created, and stream setbacks will be required.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of silvery

legless lizard. Implementation of the HCP/NCCP will result in the loss of a maximum of 298 acres of modeled habitat. Plan implementation will protect between 153 and 166 acres of modeled habitat, develop and refine conceptual models and species-habitat models to improve management, pesticide use inside preserves will be controlled, and buffer zones between urban development and Preserves will be required.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of foothill yellow-legged frog. Implementation of the HCP/NCCP will result in the loss of 0.1-mile of stream breeding habitat or 0.6-mile of stream movement habitat. Plan implementation will protect between 5.2 and 5.6 miles of, restore at least 0.8-mile of stream habitat, create or restore between 50 and 55 acres of riparian woodland/scrub, and acquire land in Zone 4 along Marsh Creek.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of midvalley fairy shrimp. Implementation of the HCP/NCCP will result in the loss of a maximum of 56 acres of seasonal wetlands. Plan implementation will protect between 129 and 168 acres of seasonal wetland complexes, create or restore between 104 and 163 acres of seasonal wetland complexes, and require additional mitigation for occupied habitat.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Mount Diablo manzanita because no known occurrences of this species would be impacted by covered activities and a maximum of 2 acres of modeled habitat would be removed by covered activities. Plan implementation would protect two or more occurrences if willing sellers are found, and between 414 and 447 acres. Preserve management will attempt to enhance habitat quality for this species, by studying historic fire regimes and the effects of prescribed fire and other management techniques, and implemented techniques that are found to enhance habitat quality for this species.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of brittlescale. Plan implementation would remove 1 occurrence of this species and 81 acres of modeled habitat. Plan implementation would protect while two or more occurrences if willing sellers are found (four occurrences under theMUDA) and at least 577 acres of modeled habitat (697 acres under theMUDA), and between 61 and 67 acres would be restored. In addition, control of non-native plants on Preserves may enhance habitat quality for this species.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of San Joaquin spearscale because no occurrences of this species would be impacted by covered activities and only 81 acres of potential San Joaquin spearscale habitat would be removed,. Plan implementation would protect between 577 acres and 697 acres of modeled brittlescale habitat,

which is analogous to San Joaquin spearscale habitat. In addition, control of non-native plants on Preserves may enhance habitat quality for this species.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of big tarplant because only one known occurrence of this species would be impacted by covered activities. Plan implementation would affect between 1,593 acres and 2,248 acres of modeled habitat. Plan implementation would protect between 9,300 acres and 11,395 acres of modeled habitat and three out of five known occurrences.. In addition, control of non-native plants on Preserves may enhance habitat quality for this species.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Mount Diablo fairy lantern. Plan implementation would affect between 488 acres and 788 acres of modeled habitat but would not remove any known occurrences. Plan implementation would protect between 11,178 and 13,360 acres of modeled habitat and protect one known occurrence ,if a willing seller is found. In addition, 42–165 acres of oak savanna habitat, which provides potential habitat for this species, would be restored.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of recurved larkspur. Plan implementation would affect 25 acres of modeled habitat and remove two of three known occurrences. In addition, over 60 acres of alkali wetland habitat, which provide potential habitat for this species, would be restored.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of round-leaved filaree because, although two known occurrences of this species and 1,448 acres of modeled primary and secondary habitat would be impacted by covered activities, at least two occurrences will be protected if willing sellers are found and 2,877–2,997 acres of modeled primary habitat, and 542–633 acres of modeled secondary habitat would be protected

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Diablo helianthella because no known occurrences of this species would be impacted by covered activities, while two occurrences will be protected if willing sellers are found. In addition, while 85 acres of modeled habitat would be removed by covered activities, 6,168–7,250 acres would be protected and 42–165 acres of oak savanna (potential habitat) would be restored.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of Brewer's dwarf flax because no known occurrences of this species would be impacted by covered activities, while one occurrence will be protected if willing sellers are found. In addition, while between 97and 255 acres of modeled habitat would be removed by covered activities, 9,337–

10,704 acres would be protected, and 42–165 acres of oak savanna (potential habitat) would be restored,

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of showy madia because no known occurrences of this species would be impacted by covered activities. Take will only be permitted as occurrences are identified and added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP). In addition, 42–165 acres of oak savannah habitat will be restored, and preserve management will attempt to enhance habitat quality for this species through removal of non-native plants.

It is the Service's biological opinion that the issuance of the ITP to the Applicants pursuant to Section 10(a) (1) (B) of the Act is not likely to jeopardize the continued existence of adobe navarretia because while one occurrence of this species could be impacted by covered activities, one occurrence would be protected if willing sellers were found. Additional take will only be permitted as additional occurrences are added to the Preserve System (one for one) and these new occurrences are comparable to the ones taken in terms of population health (population health is defined biologically in the HCP/NCCP). In addition, preserve management will attempt to enhance habitat quality for this species through removal of non-native plants.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to Section 4(d) of the Act prohibit the take of endangered and threatened animal species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement. Sections 7(b)(4) and 7(o)(2) of the Act do not apply to listed plant species.

Eight of the sixteen covered animal species addressed in this biological opinion are neither proposed for listing nor currently listed. As such, there are no take prohibitions under the Act for these animal species at the time of writing. The Incidental Take Statement for the unlisted animal Covered Species and the Permit shall become effective as to each currently unlisted

Covered animal Species if and when it becomes are listed under the Act during the terms of the permits.

The proposed HCP/NCCP and its associated documents clearly identify anticipated impacts to affected species likely to result from the proposed taking and the measures that are necessary and appropriate to minimize those impacts. The amount or extent of incidental take anticipated under the proposed HCP/NCCP, associated reporting requirements, and provisions for disposition of dead or injured animals are described in the HCP/NCCP and its accompanying Section 10(a)(1)(B) permits.

The Section 10(a)(1)(B) incidental take permit would also constitute a Special Purpose permit under 50 CFR 21.27 for the take of any Covered animal Species which may be listed as threatened or endangered under the Endangered Species Act during the permit term and which are also protected by the Migratory Bird Treaty Act, in the amount and/or number and subject to the terms and conditions specified in the 10(a)(1)(B) permit. The MBTA special purpose permit would become effective upon the listing of the species under the ESA. Any such take shall not be in violation of the MBTA of 1918, as amended (16 U.S.C. 703–712). The Special Purpose permit shall be valid for a period of three years from the effective date, provided the Section 10(a)(1)(B) permit remains in effect for such period. The Special Purpose permit shall be renewed, provided the Permittees remain in compliance with the terms of the 10(a)(1)(B) permit and the Implementation Agreement. Each such renewal shall be valid for the maximum period of time allowed by 50 CFR 21.27 or its successor at the time of renewal.

The measures described below are non-discretionary, and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to applicants, as appropriate, for the exemption in Section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Service (1) fails to assume and implement the terms and conditions, or (2) fails to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Service must track the progress of the action and its impact on the species as specified in the Incidental Take Statement. (50 CFR 402.14(I)(3).)

Amount or Extent of Take

The HCP/NCCP proposes to permanently convert a maximum of 14,502 acres in accordance with the requirements, guidelines, measures, and processes described in the HCP/NCCP document and IA. Additionally, if all of the 14,502 acres are developed, at least 25,850 acres of reserve lands are expected to be established under the HCP/NCCP (the expected maximum reserve size is 30,000 acres in order to meet all conservation requirements); take incidental to management of reserves is expected. The disturbance and conversion of land is expected to result in incidental take of the Covered Species. Incidental take that will result from habitat conversion and acquisition, restoration, and management of reserve lands will be authorized

through the Section 10(a)(1)(B) permit for the HCP/NCCP. Take will be in the form of disturbance, harm, harassment, injury, and killing. It is expected that individuals of the Covered Species will or may be taken during development as well as other activities addressed above and in the HCP/NCCP.

The Service expects that incidental take of various Covered Species will be difficult to detect or quantify for the following reasons: (1) the aquatic nature of certain of the organisms and their relatively small body size make the finding of a dead specimen unlikely; (2) the secretive nature of certain of the species (e.g., nocturnal species or species that hibernate underground for most of year) makes detection or quantification difficult; (3) species abundance may be masked by seasonal fluctuations in numbers or other causes; (4) species occur in habitats that make them difficult to detect; (5) the species use of the habitat is intermittent. Therefore, the Service estimates that take of covered animal species associated with loss of up to 13,387 acres of Covered Species habitat will be affected as a result of issuing the proposed ITPs to the Cities and County.

LISTED OR PROPOSED SPECIES

San Joaquin Kit Fox

The Service anticipates that an undetermined number of San Joaquin kit fox could be taken over a 30-year period as a result of this proposed action. Conditions on covered activities are in place to avoid direct take of kit fox but the species could be harmed or disturbed during construction activities, implementation of the proposed conservation measures, or management on the HCP/NCCP preserve system. We estimate that the covered activities will incidentally take up to up to 4,576 acres of core habitat for kit fox. These estimates likely overstate the actual amount of take likely to occur because they assume that all modeled habitat is suitable for the species.

California Red-legged Frog, California Tiger Salamander

The Service expects that incidental take of red-legged frogs and tiger salamanders will be difficult to quantify for the following reasons (1) the aquatic nature of the organisms, their relatively small body size, and their need to aestivate underground for long periods make the finding of dead or injured specimens unlikely, (2) the variable sizes of resident populations over time, and (3) the difficulty of detecting and tracking all covered activities that may result in harassment of listed species. Due to the difficulty in quantifying the number of red-legged frogs and tiger salamanders that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed project as the number of acres of habitat that will become unsuitable for the species as a result of the action. Therefore, the Service has determined that the implementation of HCP/NCCP could result in the loss of all red-legged frogs, eggs and tadpoles inhabiting as much as, but no more than 0.6-mile of stream breeding habitat, 3 acres of non-stream breeding habitat, and up to 7,785 acres of upland habitat. The Service has determined that the implementation of HCP/NCCP could result in the loss of all tiger

salamanders, eggs, and juveniles inhabiting as much as, but no more than 68 acres of breeding habitat and 5,571 acres of migration/aestivation habitat. California tiger salamander and California red-legged frog are likely to inhabit certain lands acquired for reserves and may thus be subject to harm, harassment, and disturbance from restoration, enhancement, management, and monitoring activities. While measures will be implemented to minimize take, it is possible that tiger salamanders and red-legged frog will be found within preserve lands during these activities and take could occur.

Alameda Whipsnake

The Service anticipates that an undetermined number of Alameda whipsnakes could be taken over a 30-year period as a result of this proposed action. Conditions on covered activities are in place to avoid direct take of whipsnake but the species could be harmed or disturbed during construction activities, implementation of the proposed conservation measures, or management on the HCP/NCCP preserve system. Due to the difficulty in quantifying the number of Alameda whipsnake that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed project as the number of acres of habitat that will become unsuitable for the species as a result of the action. Therefore, the Service has determined that the implementation of HCP/NCCP could result in the loss of all whipsnakes inhabiting as much as, but no more than 29 acres of core and perimeter habitat and 341 acres of movement habitat.

Alameda whipsnakes are likely to inhabit certain lands acquired for reserves and will thus be subject to harm, harassment, and disturbance from restoration, enhancement, management, and monitoring activities. While measures will be implemented to minimize take, it is possible that whipsnakes will be found within reserve lands during these activities where take could occur.

Giant Garter Snake

No records of giant garter snake have been documented within the action area and little to no impacts are anticipated. Up to 0.4-mile of core habitat and up to 2,674 acres of movement and foraging habitat could be impacted by covered activities.

Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp

The Service anticipates that an undetermined number of vernal pool fairy shrimp and vernal pool tadpole shrimp, and longhorn fairy shrimp could be taken over a 30-year period as a result of this proposed action. Vernal pool crustaceans could be killed, harmed, or disturbed during construction activities, implementation of the proposed conservation measures, or management on the preserve system. We estimate that up to 56 acres of seasonal wetland complexes potentially suitable for covered shrimp species could be impacted by the proposed action. The number of vernal pool crustaceans affected by implementation of the proposed action should be

very small, as the amount of potential vernal pool crustacean habitat is very limited throughout the proposed project's action area.

Longhorn Fairy Shrimp

Within the action area, longhorn fairy shrimp is known only from the Vasco Caves Regional Preserve. Accordingly, no direct impacts on longhorn fairy shrimp habitat are expected unless additional occupied areas are discovered within the urban development area.

Longhorn fairy shrimp has approximately 300 acres of designated critical habitat in the action area wholly within Vasco Caves Regional Preserve (Unit 1A). There are no impacts anticipated within the Vasco Caves Regional Preserve.

NON-LISTED SPECIES

Townsend's Big-Eared Bat

Few recent sightings of this bat species have been reported, and there are no published records of Townsend's western big-eared bat within Contra Costa County. However, the species likely roosts in the action area in abandoned mines, caves, and old buildings. Conditions on covered activities (i.e., seasonal restrictions) are in place to avoid direct mortality as well as harm and harassment of the bat. Up to 4,152 acres of foraging habitat for Townsend's big-eared bat are expected to be lost under the plan.

Tricolored Blackbird, Golden Eagle, Swainson's Hawk, Western Burrowing Owl

The Service anticipates that an undetermined number of covered bird species could be taken over a 30-year period as a result of this proposed action. Take associated with initial construction activities and preserve-management activities (including monitoring) will be in the form of harm or harassment. Loss of prey species and foraging habitat and disturbances to nesting and foraging habitat from construction are anticipated forms of take. Due to the difficulty in quantifying the number of covered birds that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of potential nesting and foraging habitat that will be impacted due to direct or indirect effects as a result of the action. Therefore, the Service estimates that up to 4,743 acres of potential Swainson's hawk foraging habitat will become unsuitable as a result of the proposed action. Up to 16 acres of breeding habitat for the Swainson's hawk will become unsuitable. For golden eagle, up to 13,491 acres of foraging habitat will become unsuitable. For tricolored blackbird, up to 204 acres of core habitat and 9,621 of foraging habitat will become unsuitable. For western burrowing owl, up to 5,755 acres of breeding and foraging habitat will become unsuitable.

Estimates of foraging and nesting habitat lost likely overestimate the actual take associated with the action because the estimates are based on conservative models of modeled habitat. Loss of potential nesting and foraging habitat is not expected to result in injury or mortality of covered birds because they can both forage and nest in other habitat that is available in and around the action area. Conditions on covered activities prohibit take of nests and burrows. Nest trees will not be removed while young are still in the nest.

Silvery Legless Lizard

Little is known about the species, its distribution in the action area, and its microhabitat requirements. Direct impacts to the species are likely to be small. Up to 298 acres of modeled habitat will become unsuitable as a result of the proposed action.

Western Pond Turtle

The Service anticipates that an undetermined number of pond turtles could be taken over a 30-year period as a result of this proposed action. Take is expected to be in the form of harm, disturbance, harassment, injury, and killing, through construction-related loss of habitat and management and monitoring of the reserve system. Due to the difficulty in quantifying the number of turtles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of potential habitat that will become unsuitable due to direct or indirect effects as a result of the action. Therefore, the Service estimates that up to 498 acres of potential turtle habitat will become unsuitable as a result of the proposed action and up to 0.1 acre of stream core habitat.

Foothill Yellow-Legged Frog

The Service expects that incidental take of foothill yellow-legged frog will be difficult to quantify for the following reasons (1) the aquatic nature of the organisms and their relatively small body size make the finding of dead or injured specimens unlikely, (2) the variable sizes of resident populations over time, and (3) the difficulty of detecting and tracking all covered activities that may result in harassment of listed species. Due to the difficulty in quantifying the number of the frogs that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed project as the miles of habitat that will become unsuitable for the species as a result of the action. Therefore, the Service has determined that the implementation of HCP/NCCP could result in the loss of frogs, eggs and tadpoles inhabiting as much as, but no more than 0.6-mile of stream breeding and movement habitat.

Midvalley Fairy Shrimp

The Service anticipates that an undetermined number of midvalley fairy shrimp could be taken over a 30-year period as a result of this proposed action. Vernal pool crustaceans could be killed, harmed, or disturbed during construction activities, implementation of the proposed conservation measures, or management on the preserve system. We estimate that up to 56 acres of seasonal wetland complexes potentially suitable for covered shrimp species could be impacted by the proposed action. The number of vernal pool crustaceans affected by implementation of the proposed action should be very small, as the amount of potential vernal pool crustacean habitat is very limited throughout the proposed project's action area.

EFFECT OF THE TAKE

Listed and Proposed Species

For the reasons stated in the analyses of the proposed project's effects, the Service determined that the level of incidental take specified in the effects of the action and this Incidental Take Statement is not likely to result in jeopardy to the endangered vernal pool tadpole shrimp, longhorn fairy shrimp, San Joaquin kit fox, or the threatened giant garter snake, California red-legged frog, California tiger salamander, Alameda whipsnake, vernal pool fairy shrimp, Contra Costa goldfields, or large-flowered fiddleneck. The Service has also determined that the proposed action will not destroy or adversely modify designated critical habitat for vernal pool fairy shrimp, longhorn fairy shrimp, or Contra Costa goldfields, or proposed critical habitat for Alameda whipsnake or California red-legged frog.

Unlisted Species

For the reasons stated in the analyses of the proposed project's effects, the Service determined that the level of incidental take specified in the effects of the action and this Incidental Take Statement is not likely to result in jeopardy to the following unlisted Covered Species should they become listed: Swainson's hawk, tricolored blackbird, golden eagle, burrowing owl, northwestern pond turtle, silvery legless lizard, foothill yellow-legged frog, midvalley fairy shrimp, Mount Diablo manzanita, brittlescale, San Joaquin spearscale, big tarplant, Mount Diablo fairy lantern, recurved larkspur, round-leaved filaree, Diablo helianthella, Brewer's dwarf flax, showy madia, and adobe navarretia.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

The HCP/NCCP and accompanying agreements identify anticipated adverse effects to all Covered Species likely to result from the proposed actions, and the specific measures and levels of species and habitat protection that are necessary and appropriate to minimize those adverse effects. All of the conservation and management measures in the HCP/NCCP and accompanying

agreements, together with the terms and conditions identified in the associated IA, are hereby incorporated by reference as reasonable and prudent measures, and terms and conditions for this incidental take statement pursuant to 50 CFR 402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under Section 10(a)(1)(B) and Section 7(o)(2) of the Act to apply. If the Applicants fail to adhere to these terms and conditions, the protection of the Permit, and Section 7(o)(2), may lapse. The amount or extent of the incidental take anticipated under the HCP/NCCP, associated reporting requirements, and provisions for disposing of dead or injured animals, are as described in the HCP/NCCP and its accompanying Section 10(a)(1)(B) permits.

Further, the following terms and conditions apply to the SERVICE after issuance of the Permit:

- The Service shall provide technical assistance to the Applicants throughout the term of the Permit.
- The Service shall, at the time of listing of any of the currently unlisted Covered Species, reinitiate consultation on the proposed actions in accordance with 50 CFR 402.16.
- The Service shall ensure that any Section 7 consultation with other Federal agencies regarding activities covered by the permits are consistent with the conservation goals and objectives of the HCP/NCCP, and that any such activities reviewed under Section 7 and the Act shall provide levels of listed species protection consistent with the protection afforded under the HCP/NCCP.

REPORTING REQUIREMENTS

The Implementing Entity shall provide the Wildlife Agencies with an Implementation Annual Report by May 1 of each full calendar year the HCP/NCCP is in effect. The Implementation Annual Report shall include all of the information identified in Chapter 8 of the HCP/NCCP, including the results of the Compliance Monitoring implemented by Applicants and the Biological Effectiveness Monitoring implemented by the IE during the prior calendar year, and provide an accounting of all mitigation fees collected, all urban development permits issued, and all mitigation lands acquired.

The Applicants shall each implement the annual report requirements described in Chapter 8 of the HCP/NCCP. In addition, at any other time during the Permit terms, the Applicants, at the request of the Service or DFG, shall provide within thirty (30) days, to the Wildlife Agencies additional information relevant to implementation of the HCP/NCCP reasonably available to the Applicants.

CONSERVATION RECOMMENDATIONS

No voluntary conservation recommendations are needed or proposed for the proposed action.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation and conference on the issuance of a Permit to implement the HCP/NCCP. As provided in 50 CFR 402.16, reinitiating of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals that the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiating.

The Incidental Take Statement provided in this conference opinion for unlisted Covered Species does not become effective until the unlisted Covered Species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. If you have any questions regarding this consultation, please contact Sheila Larsen at the Sacramento Fish and Wildlife Office, Sacramento, California,

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